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JOURNAL *of* EDUCATIONAL RESEARCH

Volume IX FEBRUARY, 1924 Number 2

HIGH-SCHOOL TEACHERS OF THE SOCIAL STUDIES: THEIR TRAINING AND THE SUBJECTS THEY TEACH

P. W. HUTSON
University of Pittsburgh

The study here presented is based on data gathered from high-school teachers of Minnesota. In 1921-22 the College of Education of the University of Minnesota made an investigation of the training and the teaching programs of the high-school teachers of the state by sending them a questionnaire calling for such information. Replies were received from 1,134 teachers, or about one-third of the teachers of the state.[1] For the making of the study reported in this article the writer isolated the questionnaires of the 290 teachers who reported in their teaching programs one or more classes in the social studies, history, civics, economics, or sociology. They were divided into four groups according to the size of the high-school faculty from which they came. The following tabular arrangement explains the grouping:

	Number of Teachers
Group I. Faculties of 30 or more	43
Group II. Faculties of 11-29 inclusive	69
Group III. Faculties of 10 or fewer	112
Group IV. High-School Departments of State Graded Schools	66
Total	290

[1] The primary digest of information from these questionnaires, as made by the writer under the direction of Doctor L. V. Koos, has been published by the Bureau of Educational Research, College of Education, University of Minnesota, as Educational Monograph No. 3, entitled *Training of the High-School Teachers of Minnesota.*

For several of the tables, which appear later in this article, the numbers of teachers in each group are slightly less than given above because a few questionnaires were incomplete.

The Teachers' Programs

The Number of Subjects Taught.—Table I summarizes the responses of the teachers of the social studies by showing the number of different subjects they were teaching in 1921-22.

TABLE I. PERCENTAGE DISTRIBUTION OF THE TEACHERS OF SOCIAL STUDIES ACCORDING TO THE NUMBER OF SUBJECTS THEY TEACH

Number of Different Subjects	Group I (43)	Group II (69)	Group III (112)	Group IV (66)
1	39.5	14.5	3.6	....
2	41.9	42.1	19.7	12.1
3	18.6	23.2	42.9	30.3
4	....	16.0	25.0	28.8
5	....	2.9	5.4	22.7
6	....	1.5	2.7	4.5
7	....	....	0.9	1.5
Totals	100.0	100.2	100.2	100.0

In determining what should constitute a "subject," it was decided to follow the lines of cleavage most commonly used in the departmentalization of a college of liberal arts, and accordingly throughout this report each one of the following has been regarded as a subject: English, mathematics, Latin, Greek, German, French, Spanish, history, political science, economics, sociology, chemistry, physics, botany, zoology, biology, physical geography and geology, astronomy, physiology, agriculture, public speaking, home economics, shop and mechanical drawing, music, graphic arts, commercial subjects other than economics, and physical education.

Beginning in the upper left-hand corner of the table, we read that of the 43 teachers of social science in *Group I* 39.5 percent were teaching just one subject, while 41.9 percent were teaching two subjects. Passing to *Group IV* it may be seen that none of

the 66 teachers of social science was teaching just one subject, that only 12.1 percent were teaching two subjects, and that the vast majority were teaching three, four, or five subjects. These percents are based on the number of subjects taught during the school year, including both first- and second-semester subjects. The significance of this table appears as we compare the percent of teachers in each group who were teaching the different numbers of subjects. It constitutes a measure of the difference between teachers' programs in large and small high schools. But there is significance also in the fact that even in the largest high schools—Group I—less than 40 percent of the teachers of the social studies were teaching just one subject and that almost one-fifth were teaching three subjects.

For comparison's sake an extract from a similar table covering the entire 1,134 teachers studied originally may prove interesting. Of these teachers the following percents, by groups, taught one subject: Group I, 71; Group II, 55; Group III, 30; and Group IV, 2. These figures indicate that considerable proportions of these groups were teaching single subjects, but when we glance at the first row of figures in Table I it becomes plain that relatively few of the single-subject teachers came from the ranks of those who teach the social studies.

Table I is especially significant in view of the fact that teacher-training institutions do not generally pretend to give adequate preparation for teaching in more than one or two subjects. They usually consider each of the social studies as separate subjects, inviting students to "major" in history, political science, economics, or sociology.

Confirmation of our suspicion that teachers of the social studies are teaching more subjects than they were trained for, is afforded by the figures which show the number of subjects taught by these teachers during their entire teaching careers. Space does not permit a table similar to Table I, but the facts may be epitomized in the statement that the following percents of the groups have taught *five or more* subjects: Group I, 20; Group II, 34; Group III, 54; and Group IV, 59.

Looking at the matter from a different angle, the percent of the teachers in each group who were teaching social science was figured and it was found that the percents for the four groups were: 14, 20, 33, and 52, respectively. Mutually explanatory and re-enforcing are the multi-subject programs shown in Table I and the fact that approximately one-third and one-half of the teachers of Groups III and IV, respectively, were teaching social studies. Such figures as have been presented show a need for vast improvement in the teaching situations. Teachers cannot be adequately prepared in so many subjects.

Relation Between Teaching Experience and Difficulty of Teaching Program.—From a percentage distribution table of

TABLE II. SUMMARIZED PRESENTATION OF YEARS OF EXPERIENCE OF TEACHERS OF SOCIAL STUDIES

	Years of Experience in Accredited High Schools			Total Years of Teaching Experience		
	First Quartile	Median	Third Quartile	First Quartile	Median	Third Quartile
Group I (41)	2.75	6.88	12.75	4.10	8.52	18.32
Group II (67)	0.00	2.25	4.63	1.14	2.81	7.69
Group III (107)	0.00	2.12	3.75	1.34	3.03	6.38
Group IV (63)	....	....	....	0.00	1.76	4.22
Total (260)	1.09	2.52	5.98	1.23	3.09	7.11

the teachers of each group according to their years of experience, the median years of experience were computed, also the first and third quartiles. These are presented in Table II. Their chief significance lies in the contrast between the different groups. *Years of Experience in Accredited High Schools* were not computed for Group IV, because, since those teachers were not at that time in accredited schools, such figures did not seem pertinent. The figures indicate a considerable correlation between years of experience and size of school, which means a *negative* correlation between years of experience and difficulty of teaching schedule.

Number and Character of the Subject-Combinations Taught.—Table III accounts in one way for every appearance of each

of the social studies in the teachers' programs, giving the number of teachers in each group who were teaching the subject and a distribution to show the percent of teachers who were teaching it as a single subject or in varied subject-combinations. The reader is invited to read the table as should a teacher-training agency, or as should a student in such an institution, seeking an acquaintance with the teaching situation to enable him to make proper preparation for it. For example, of the 32 teachers of history in Group I, 43.8 percent were teaching that subject alone, 40.5 percent were teaching one additional subject, and 15.6 percent were teaching two additional subjects. Of

TABLE III. PERCENTAGE DISTRIBUTION OF THE SOCIAL STUDIES TO SHOW THE EXTENT TO WHICH THEY APPEAR SINGLY AND IN COMBINATION, IN EACH GROUP

Subjects	Number of Teachers	Percentage of Times Each Subject Appears						
		As a single subj.	In a 2-subj. comb.	In a 3-subj. comb.	In a 4-subj. comb.	In a 5-subj. comb.	In a 6-subj. comb.	In a 7-subj. comb.
History								
Group I	32	43.8	40.5	15.6	....	....	....	....
Group II	55	14.5	38.2	27.3	14.5	3.6	1.8	....
Group III	89	4.5	20.2	43.8	22.8	5.6	2.2	1.1
Group IV	51	....	15.7	31.4	27.4	17.6	5.9	2.0
Political Science								
Group I	11	....	54.6	45.4	....	....	....	....
Group II	29	3.4	37.9	24.1	27.6	3.4	3.4	....
Group III	44	....	6.8	36.4	38.6	11.4	4.6	2.3
Group IV	19	....	....	21.1	36.8	36.8	....	5.3
Economics								
Group I	9	....	33.3	66.7	....	....	....	....
Group II	19	....	31.6	21.1	31.6	10.5	5.3	....
Group III	24	....	8.3	41.7	29.2	16.7	4.2	....
Group IV	12	....	....	16.7	16.7	50.0	8.3	8.3
Sociology								
Group I	7	42.9	28.6	28.6	....	....	....	....
Group II	12	....	33.3	8.3	41.7	8.3	8.3	....
Group III	20	....	15.0	35.0	30.0	15.0	....	5.0
Group IV	14	....	....	14.3	35.7	50.0	....	....
Social Science								
Group I	43	62.8	32.6	4.7	....	....	....	....
Group II	69	42.1	37.7	13.1	7.3	....	....	....
Group III	112	12.5	32.1	40.2	11.6	2.7	.9	....
Group IV	66	....	22.7	36.4	27.3	9.1	4.5	....

the 55 history teachers in Group II, but 14.5 percent were teaching that subject alone, while nearly half were teaching two or more additional subjects.

Reading in this manner, we may study the position of each of the social studies in the teaching situation. It is quite apparent that the prospective teacher of political science, economics, or sociology must prepare to teach several additional subjects, for not even in the largest high schools does he have more than the slenderest chance of teaching the single subject. In Group III, for example, more than 90 percent of the teachers of political science and economics teach two or more additional subjects; the same is true for 85 percent of the teachers of sociology and for 75 percent of the history teachers in that group. These are very important considerations for teacher-training institutions in view of the fact that so many of their graduates start their teaching careers in schools of Group III.

For comparison's sake there is introduced at the foot of Table III the distribution of teachers with all social studies considered as one subject, social science. It seems that only about one-eighth of the Group-III teachers of social studies are privileged to do all their teaching in that field.

Since it was felt that a further inspection of the subject combinations might reveal some landmarks for teacher-training institutions in the guidance of their students, a tally was made to determine the degree of recurrence of combinations. As far as the social studies were concerned, a state of disorganization was disclosed. The only notable recurrences in all-social-science combinations were history-political-science, appearing four times in Group I, eight times in Group II, and twice in Group III, also history-political-science-economics, appearing three times in Group I, and history-political-science-economics-sociology, appearing four times in Group II and twice in Group III.

A more complete analysis of the subject combinations, however, is presented in Table IV. The procedure followed in the making of this table was simply to count all the frequencies of subjects appearing in combination with history, for example,

TABLE IV. THE PERCENT OF THE SUBJECTS COMBINED WITH EACH SOCIAL STUDY WHICH ARE OTHER SOCIAL STUDIES

Subject	Groups I and II	Group III
History	50.4	28.0
Political Science	69.9	44.3
Economics	65.0	43.8
Sociology	77.8	52.8

and then to determine what percent were social studies other than history. Based on these computations, we are enabled to say that of the subjects appearing in combination with history in the programs of the teachers of Groups I and II, 50.4 percent were other social studies. The first column of figures reveals some tendency to combine the social studies in the programs of the teachers of Groups I and II—a decided tendency, in fact, when compared with the percents for Group III, yet not strong enough to controvert our previously acquired impression of chaos in subject combinations.

From the data which have been presented in describing the programs of social-science teachers, the following are the principal conclusions:

1. Many teachers of social studies are teaching more subjects than they could possibly be well prepared for.

2. The smaller the high school the more difficult is the teacher's program.

3. The more inexperienced teachers are in the smaller high schools.

4. Very few social-science teachers are privileged to teach one subject only, and in the high schools of faculties numbering less than ten, it is safe to say that every social-science teacher should expect to teach at least four subjects.

5. Subject-combinations show practically no standardization and represent such a chaotic situation in the smaller high schools as to render too difficult the adequate preparation of teachers; but in the larger high schools there is a marked tendency to combine the social sciences in teachers' programs.

Before remedial measures can be properly outlined and appreciated, however, the reader should possess a knowledge of the social-science teacher's preparation for his work, which will be the subject of the next section.

The Teachers' Preparation in Social Science

A natural preliminary to the examination of the training of these teachers would be to set forth the standards by which the training for the particular teaching-subjects can be judged. There are no commonly accepted standards in existence, however, and many states issue blanket certificates permitting college graduates to teach any high-school subject. The Committee of Seventeen[2] recommended that one of the elements of a teacher's training should be "a detailed and specialized study of the subjects to be taught." The College of Education at the University of Minnesota has sought to give definite interpretation to this standard by recommending for all teachers of the social studies a "major in history, minor in social science," or the same combination with the emphasis reversed. As translated from quarter-hours to semester-hours, the first recommendation is approximately as follows: history, 24; political science, 9; economics, 6; and sociology, 6—making a total of 45 hours. This standard will be used for measuring the training of the teachers under consideration in this study. This alignment of studies will be considered as providing for introductory year-courses of approximately six hours each in ancient, European, and American history, with six additional hours for advanced courses, acquaintance with the organizations and problems of national, state, and city governments, and a good foundation in the principles and problems of our economic and social life.

Special Preparation in Higher Institutions Which Teachers of Social Studies Have Had for Their Teaching-Subjects.—Table V presents a summary of the specialized training of the

[2] Halleck, Reuben P., chairman. "Professional Preparation of High-School Teachers." *Proceedings of the National Education Association.* 1907. Pp. 523 ff.

TABLE V. SEMESTER-HOURS OF PREPARATION IN HIGHER INSTITUTIONS FOR THE SUBJECTS TAUGHT

Subjects	Number of Teachers Reporting	Number Without Preparation in Higher Institutions	Semester-Hours of Preparation		
			First Quartile	Median	Third Quartile
History					
Group I	29	1	14.3	19.7	30.5
Group II	54	6	9.5	18.5	31.5
Group III	88	10	7.5	18.0	28.0
Group IV	46	6	6.3	12.8	20.5
Political Science					
Group I	10	1	4.3	6.0	14.3
Group II	29	10	1.5	3.9	11.6
Group III	43	19	1.7	3.8	10.5
Group IV	18	12	1.1	2.3	4.5
Economics					
Group I	9	2	2.3	5.0	14.5
Group II	18	3	5.5	10.0	15.5
Group III	23	7	2.5	4.5	8.3
Group IV	11	3	2.8	5.0	12.8
Sociology					
Group I	5	0	4.6	6.5	9.5
Group II	11	1	3.3	4.3	6.4
Group III	19	6	1.6	5.0	10.2
Group IV	13	3	3.1	4.0	4.9

teachers of each social study, each group considered separately. The number of teachers under consideration in each instance is given so that the degree to which the data are representative may be judged. For each group is given the number of teachers *Without Special Preparation In Higher Institutions* for the subjects they were teaching, as this was felt to be one measure of importance. After the distribution of the semester-hours of preparation of the teachers of each subject was determined, the first quartile, median, and third quartile for each array were figured, and have been recorded in the three right-hand columns of the table.

Glancing down the column showing the number of teachers without any collegiate preparation for their subjects, the reader will note by comparison with the total number of teachers in each group that the proportion of such unprepared history teach-

ers ranges between one-eighth and one-ninth in Groups II, III, and IV. For the political-science teachers of the same groups, the proportion runs from one-third to two-thirds, a truly deplorable state of affairs. There are also considerable proportions of the teachers of economics and sociology, almost one-third in some groups, who have had no college courses in those subjects. To the writer these figures indicate that the demand for teachers trained in political science, economics, and sociology is not being met, and accordingly that these half-year social studies are being "tacked on" to the programs of teachers who were trained in other fields.

An illustrative reading of the columns of quartiles and medians in Table V would be as follows, beginning with the first line: 25 percent of the teachers of history in Group I have had less than 14.3 semester-hours of training in that subject, 50 percent have had less than 19.7 hours, 75 percent have had less than 30.5 hours, and the remaining 25 percent have had more than that number; the middle 50 percent have had between 14.3 and 30.5 semester-hours.[3] An over-view of these figures for history and political science indicates that the preparation of the teachers of each group is more meager than that of the group next above. This is to be expected because of the larger number of subjects taught by each teacher in the smaller schools. No such contrast is discernible among the teachers in economics and

[3] These quartiles and medians were figured by the "irregular step" method. The explanation may not seem quite accurate in some cases, as, for example, in Group IV, political science. We see plainly there that 2/3 of the 18 teachers have had 0 hours of training, yet the first quartile and median are given as 1.1 and 2.3 hours. The exact array in this case stood as follows:

Hours of Training	Number of Teachers
0	12
3	2
5	1
6	2
18	1
Total	18

The first step was considered to be from 0 to 2.999 hours, and the number of teachers was such that both the first quartile and median had to be located on the step. The second step was considered as from 3 to 4.999 hours, etc. The "irregular step" method seemed as accurate as any that could be used and was employed consistently.

sociology, perhaps because the numbers of teachers are not large enough to be fully representative. But it is noticeable that in these subjects the teachers of Groups III and IV are more frequently totally without collegiate preparation than are those of Groups I and II.

Applying our 24-9-6-6 standard, it is quite clear that more than 50 percent of the teachers in all fields are inadequately prepared. It must be admitted, of course, that no accurate measure of the history situation is presented. Many of the history teachers were teaching only one or two of the three main divisions of the subject, and their 12 or 18 hours of training *might* have been in just those fields. On the other hand, such might not have been the case; and many of the teachers having had 24 or more hours of preparation in history might not have been prepared in all three fields. An examination of the records of the 67 practice-teachers who were under the writer's supervision at the University of Pittsburgh in 1922-23 revealed nine who had taken 24 or more hours in history. Of these only one had approximated such training in each of the three fields as it has been indicated the 24-hour standard should comprise. From this analogy it seems probable that but few of the history teachers included in this investigation are adequately prepared to teach all three divisions of history, but the exact extent of their preparedness for the particular divisions which they were teaching will have to be determined by more detailed data than the writer has at hand.

Some Measures of the Total Collegiate Training in Social Studies of the Teachers of Those Subjects.—The first section of this article made it clear that the teacher of any one of the social studies should be prepared in several subjects; that with a few exceptions in the largest high schools he is required to teach a combination of subjects; that in the schools of Groups I and II, where subject-combinations are not so confused as in the smaller schools, there is a considerable tendency to combine the social studies; that this tendency seems commendable in view of the related character of these subjects. Now, in view of these facts,

it seems worth while to determine the extent to which the teachers have combined the social studies in their specialized training for their profession. Is their preparation for teaching of such a character as to justify us in advocating the combination of social studies in their teaching programs? It is not. Space will permit only a sketchy presentation of evidence in support of this assertion.

The 270 teachers who made an adequate report of their training present a total of 314 adequate preparations, using our 24-9-6-6 standard; in other words, they average in adequate preparation a little more than one of the four social sciences per teacher.

The median number of hours of training in social science of Group I, was 32; of Group II, 33; of Group III, 27; and of Group IV, 20. These medians fall far short of the 45-hour standard. One-third are not adequately trained in any social study. Another third are adequately trained in but one of them.

In the light of such data, how can the combination of social studies in teachers' programs be effected with the present generation of teachers? They are not fitted to teach such a logical combination; they have not been trained that way.

From the data which has been presented in description of the social-science teachers' special preparation for their teaching subjects, the following are the principal conclusions to be drawn:

1. When measured by standards which can scarcely be considered too high, large numbers of the teachers of the social studies are insufficiently prepared for the subjects they are teaching. Especially is this true in the smaller high schools.

2. Measures of the total social-science training of the teachers of social studies indicated that but few of them are fitted to teach combinations of those subjects.

Taking up these conclusions in conjunction with those made relative to the teachers' programs, we recognize the imperative need for reform. Two of the conditions most essential for the successful operation of our educational machinery are involved: the teacher's program of work and her preparation for it. The

institutions which train the teacher and the school administrators who designate her duties bear the responsibility for the existing situation and should jointly take up the task of improving it.

The remedial measure, which the situation logically calls for, is the cutting down of the number of subjects teachers may be required to teach. Probably the first means of improving the worst situations would be to eliminate the high schools with very small instructional staffs. This would be a difficult problem to work out. A second means of effecting the desired change would be reorganization, especially of the small school systems, on the six-six basis. In a study of the training of the high-school teachers of the state of Washington, Koos and Woody[4] urge this measure as the best means of decreasing the number of subjects assigned to each teacher. Their recommendation seems just as pertinent for Minnesota or for any other state as for Washington. With the six-year secondary period, it is easier to have each teacher's five or six classes come in a single department. This is true even in the smaller high schools where most of the classes are too small to require more than one section. The longer the vertical distribution through the grades, the narrower the specialization may be.

A third means of decreasing the number of subjects which teachers may be required to teach—a method applicable to high schools of all sizes—is the simplification and standardization of the subject combinations. From the description which has been given, it would seem that much good might be accomplished by following up and further promoting the combination of social sciences in teachers' programs. The relationship of these subjects to each other is closer than to any other subjects. If teachers must teach more than one subject, is it not logical to assign them the most closely related subjects?

To effect this change we must call upon the teacher-training institutions to prepare teachers for the social-science combination. If they work in cooperation with high-school administrators

[4] Koos, L. V. and Woody, Clifford. "The Training of Teachers in the Accredited High Schools of the State of Washington." *Eighteenth Yearbook of the National Society for the Study of Education*, pp. 213-57.

such a combination can be standardized. The policy should be taken up and agreed upon by those voluntary agencies which cover a wide area, such as the North Central Association of Colleges and Secondary Schools or the National Education Association, because teachers continually cross state lines. The teachers of social studies covered in this investigation were trained in 49 different institutions located in 14 states and Canada, though 77 percent received their training at institutions in Minnesota and 39 percent at the state university. A further reason for recommending cooperation over a wide area is the very plausible view that the unstandardized conditions found to prevail in Minnesota high-school teaching programs are somewhat general. This view is supported by the study of the training of the high-school teachers of the state of Washington, made by Koos and Woody in 1917, and already cited in this paper. Their investigations revealed a condition of chaos in the teaching combinations and a considerable percent of inadequately trained teachers.

But important remedial action can and should be taken at once by the colleges and universities individually without awaiting any general agreement among themselves or with public school administrators. They should train their students to teach several subjects and guide them into logical combinations of subjects, in recognition of the fact that their graduates go first into small schools where they must teach several subjects. In view of the marked tendency in schools having faculties of more than ten teachers to combine the social sciences in teachers' programs, it seems that teachers so trained will be much more likely to find positions for which they are prepared than if they specialize too narrowly or choose hit-or-miss combinations in their elections.

A further reason why the colleges should take such guidance measures lies in the recent changes in the high-school curriculum looking toward courses in unified social science. The courses in Community Civics for the ninth year and Problems of Democracy for the twelfth year, recommended by the Committee

on Social Studies of the Commission on the Reorganization of Secondary Education of the National Education Association,[5] are rapidly being accepted the country over, and public school administrators are combing their faculties and each year's crop of new teachers in a vain effort to find teachers equipped for those subjects. Furthermore, the Committee has profoundly influenced the nation's appreciation of sociological values as the outstanding reason for teaching history. Surely to realize such values the teacher must have a knowledge of the principles which are basic in our economic, political, and social life. Accordingly, it will be seen that the 24 hours in history which is included in the 24-9-6-6 standard should not alone be considered adequate training for the teaching of that subject. Some training in the other three social sciences appears indispensable if the teacher is to help students to realize the most important values of history.

The situation with regard to the training of teachers can also be improved by a more rigid certificating system than that employed in Minnesota, which is similar to that of many other states. The college graduate may secure in that state a license which enables him to teach any subject in any high school, provided he has met certain requirements in pedagogical training. No pressure is exerted requiring local authorities to secure persons of exact qualifications. Many of the states could improve the situation with which we are here concerned by so tightening up their systems of certification as to bring about a closer relationship between the teacher's training and his work.

To the mind of the writer, the facts that this study has revealed point quite clearly to a confusion of the cultural and vocational aims in our teacher-training institutions. Most of our teachers study their content courses in liberal arts colleges, taking enough work in the department or college of education to meet the requirements of the state. In the "small college" the department of education has but little influence in determin-

[5] Dunn, Arthur W., compiler. *The Social Studies in Secondary Education.* Washington, D. C., Government Printing Office, 1916. 63 pp. (U. S. Bureau of Education Bulletin, 1916, No. 28.)

ing the curriculum followed by prospective teachers, although large percents of the students of such institutions pursue their course with the vocational intention of preparation for the teaching profession. Regardless of such intentions they follow the same curriculum as do those whose intentions are cultural, for the realization of the cultural aim has always been the primary reason for the existence of the liberal arts college.

The situation is not far different in the universities. The colleges of education are still young and weak, and, though steadily assuming larger powers, they as yet have little control over the prospective teacher's content courses. In fact, they have been so occupied with the meeting of the rising tide of universal secondary education, the development of the scientific study of education, and the larger and larger demands for pedagogical courses due to the imposition of higher state standards in the pedagogical training of teachers, that they have thought but little about the training of teachers in content. As a result of these circumstances, the teacher's training is still almost wholly governed by liberal arts aims and traditions, rather than vocational considerations. The writer submits his opinion that the facts disclosed by this investigation constitute a recommendation for larger control of the teacher-training curriculum by colleges of education to the end that such training may be given the proper occupational slant.

WHAT SHOULD CHILDREN READ IN SCHOOL?

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[*Continued from the January number*]

I have glanced at the development of reading material from the days of the hornbook to the textbook of the present period. I have observed that the authors of the more recent readers substantially agree upon *interest* as a quality which should guide them in selecting reading matter; but that they do not agree either among themselves or—what is more serious—with the children as to what is interesting. I have also noted the increasing dominance of the literary ideal in connection with reading material; but I have questioned the sufficiency of this ideal. As actually put into practice I have even questioned its appropriateness; and I have advanced the view that, since reading material is valuable because of its usefulness in teaching children how to read, literature has no more inherent right to preëmpt the pages of our reading books than has geography, history, or science.

The further consideration of what children should read in school is closely related to a consideration of methods of teaching reading, especially methods of teaching silent reading. Such methods, it has been pointed out, must address themselves to the development of speed and comprehension—especially the latter. In most school systems, pupils begin the use of books by the middle of the first school year, and thus it is very early in the child's educational career that the question of selecting the right kind of reading matter confronts us.

Remembering that our largest task, as we now conceive it, has to do with silent reading rather than with oral reading, and that in teaching silent reading we wish to develop rate and comprehension, let us in the light of these facts examine some first-reader selections.

These are taken practically at random from a pile of first readers in common use. Each one of them represents all the reading matter on a page of one of these books.

FIRST SELECTION

See me drive the horse.
Papa is making hay.
Here is my rake.
I am raking the hay.
I like to drive the horse.
I like to rake the hay.
Papa and I are making hay.
This is Papa's horse. I am the driver.

SECOND SELECTION

It is great fun to skate.
We all have roller skates.
We go to school on our skates.
We race on our roller skates.
All the boys and girls race to school.
Away we go! Away we go!
The faster we go, the greater the fun.

THIRD SELECTION

See this wooden spade.
This is my wooden spade.
I am going to play in the sand.
Will you go with me, Mary?
Will you go with me, John?
It is fun to play in the sand.
I am going to play on the sandy shore.
It is fun to play on the sandy shore.

Imagine asking a child to "tell the story" of passages like these. Try to make up questions which will test his comprehension of them. There isn't any story to them, nor is there any consecutive statement of how something was done. Indeed, consecutiveness of any sort is precisely the lack of these pieces.

The passages I have quoted are from first readers. The usual primer is even worse—that is, it is worse from the point of view of the teaching of silent reading. Some of it may be interesting, some of it may even have literary quality—although neither interest nor literature appear to be served by the passages I have quoted. It is, however, the unrelated character, the incoherent content, the lack of progressiveness which robs this material of its value for silent-reading purposes. We shall find

that all through the work of the elementary school this quality of consecutiveness in reading material will be a prime requisite.

A number of methods of conducting silent-reading recitations have lately been recommended—methods which have proved remarkably effective wherever they have been consistently employed. These methods seek to control speed and comprehension, and strongly to motivate the procedure with these objectives in view. For example, reading under the spur of timed conditions and with control of comprehension either through reproduction or through answers to questions is found to be an effective method. It becomes effective largely because the eye and the mental process which the eye conditions are habituated to a regular and progressive functioning.

For this purpose we not only need interesting material—material possessing those qualities which, as we have seen, produce interest—but we must also have easy material. It seems to me that no point with reference to what children should read when they are learning to read is more important than the level of difficulty which the material should exhibit.

Here the textbook makers are badly at sea. For example, the story of "The Town Mouse and the Country Mouse" is thought by one to be suitable for the primer; three others use it in the first reader; another uses it in the second reader; and still another uses it in the third reader. Again "The Ginger Bread Boy" is offered in the primer, the first, the second and the third reader. There is, as Hosic points out, no clear consensus as to the difficulty which various selections may be supposed to present to pupils. He finds that no piece used in five or more series of readers is uniformly placed in the same school year. "The common range in such cases is four or more grades and some pieces are placed in seven and eight school years."

It is almost certain that whenever a given piece is assigned to different grades it is most correctly placed in the highest grade. All our reading books are too hard. With one or two recent exceptions they have been designed for use in the oral-reading recitation. It is my judgment that they are distinctly

too difficult even for that purpose. But it is certain that their difficulty becomes even more of a bar to their use when they are employed as material for the teaching of silent reading.

In the experiment which Doctor O'Brien carried out in Illinois a few years ago—an experiment lasting forty days and designed in twenty-minute daily periods to increase the rate of reading—no difficulty which he encountered was so embarrassing as the difficulty of securing a sufficient amount of easy reading material. You have no idea, unless you have tried it, how vastly greater is the amount of reading matter required when silent reading replaces oral reading in the school curriculum. It was found that the average reading rate of children trained for forty days in rapid silent reading was from three to four hundred words per minute in the sixth, seventh, and eighth grades. Individuals ran as high as six or seven hundred words per minute. Now, the average page of a reader contains about 250 words. You can therefore readily see that many pupils in these grades would read nearly, if not quite, two pages a minute. It takes little figuring to ascertain the large amount of material which must be provided to sustain a method which is carried on at such speeds.

I should now like to point out what I believe the reading books are likely to become in the next five to ten years. In the first place, I think they will be much larger. It is entirely likely, for example, that a third reader may consist of two, three or four volumes. Why not? More material than can be comprised in several volumes will be required. In Detroit it is reported that from four to thirty-two primers and first readers are covered by the pupils who are taught silent reading from the beginning according to the plans now in use there. It is much less expensive for a board of education to purchase its material in one series than in several, not only because books in sets are cheaper to manufacture and therefore to purchase, but also because when books of different publishers are purchased there is an enormous loss through duplication of material.

Woody found that among second readers such statements as the following could be made: "The Progressive Reader de-

votes 14.5 pages to subject matter occurring in the Carroll and Brooks Reader and the same number of pages to subject matter contained in the Riverside Reader. It includes 19 pages of material found in the Rational Reader, and 30 pages of material found in the New Education Reader. Again, the Golden Treasury Reader devotes 22 pages to subject matter occurring in the Edson-Laing Reader, 20 pages to subject matter occurring in the Progressive Reader, and 20 pages to subject matter occurring in the New Educational Reader." Clearly, if we are going to furnish content for the new program in silent reading we shall have to make new publishing arrangements. It would be entirely possible after a half dozen readers for a given grade had been purchased to find that no more than fifteen or twenty percent of the material in each additional book was really new. The argument, therefore, for much larger readers for each grade, running in all likelihood to three or four good-sized volumes, is neither fanciful nor impracticable.

In the second place, in order to fit modern conceptions as to the teaching of reading, the material must facilitate rapid, rythmical eye-movements. It must therefore be easy, interesting, and flowing in style. Hard words, unusual turns of expression, rough or uneven style, lack of clearness of expression, subtlety of thought—all these arrest the movement of the eyes and prevent the setting up of those efficient habits which have been found to accompany good reading. If a piece which pupils are about to read has not been freed of these difficulties the teacher should prepare the pupils for the reading and forestall as many of the difficulties as possible. Difficult words should be explained not only as separate words but in context. And if the actual context in which the pupil will shortly find the words is used, the preparation will be so much the more effective.

In the third place, the new readers for silent-reading purposes should be accompanied by mechanical devices to facilitate the timing of the reading. The lines of each page should be numbered. The number of words per line and the number of lines per page should be relatively constant for the entire book and should be known by the pupils and the teacher. With this

information the teacher can always obtain from each pupil a record of the number of words read per minute in any assignment.

This is important. The successful teacher of silent reading will be successful in proportion to the effort which she is able to elicit from the pupils. No device of which I am aware secures such concentrated, purposeful effort as the so-called timed-section device, especially when that device is accompanied by the making of accurate daily records. I have found it entirely practicable to have children in grades as low as the third make charts on which they enter opposite a vertical scale of words per minute, and above a horizontal scale for the dates, a dot indicating their speed on the day in question. They then connect this dot with the one for the day before and thus build up a progress graph in which they became tremendously interested. Of course, the desire is to see the graph move steadily upwards.

In the fourth place, the ideal silent reader should and no doubt will contain many other devices. Some of them have already been developed by the test-makers. These devices will be designed to indicate without the necessity of oral reading the fact that the child has read a given page understandingly. In pursuance of this idea the progressive reader will have many questions on the thought of the material contained in it. These questions may not only be answered by the pupils after having read the page to which they belong, but they may also be used in the reverse order. In other words, a question may be read first and then a passage may be read to find out the answer. This involves a different type of reading. The rate idea may be introduced by having the children compete with each other to see who can find the answer first.

In following out this idea of devices for measuring comprehension, we may note that readers, especially those designed for the primary grades, may contain questions to be read silently and answered orally. For example, "Can a chair walk?" "Have you a dog?" "Does the sun rise in the evening?" Again, pictures may be shown accompanied by directions or little stories in which some of the statements do not agree with the pictures. For example, a picture in a certain reader shows Mrs. Rabbit

going to market with a basket on her arm. Certain details of dress and setting are evident. A paragraph might be printed in which certain incorrect statements would be made and in which it would be stated or implied that Mrs. Rabbit wears glasses (which she does not) or that she carries her basket on her right arm (whereas, the picture shows it to be on her left arm). Such a device would serve in an interesting way to provide reading matter, the comprehension of which might be made evident without oral reading. Of course, the game is for the child to locate the incorrect statements.

In the fifth place, it will be found that what Professor Horn calls factual material will be better than most of the fanciful and conversational matter with which the present readers are filled. One of the reasons why this is so is that factual material may be rigorously tested. For we must never get away from the thought that while we are training for speed we are also insisting upon comprehension. Of the two, comprehension is undoubtedly the more important. No one is interested in the speed with which children can read what they do not understand. Accordingly, in deciding what kind of reading matter to put into our ideal series of readers, we should include much informational matter. Good narrative material is likewise desirable; but as Horn says, there will be no tendency to leave that out. We shall thus be able to use the content of our readers for speed exercises while at the same time we may objectively test the extent to which the pupils have understood what they read.

In the sixth place, the individual selections or passages presented in the ideal textbook should be long enough to occupy the most rapid readers for several minutes. Even where we wish to concentrate attention—as we frequently do—upon a single paragraph with the idea of summarizing it or of making a topic sentence about it, the paragraph which is in context is better than the one which is isolated. Moreover, long selections are favorable to that type of comprehension which involves the organization of material. Professor Horn says there are four objectives in teaching silent reading; namely, speed, comprehension, organi-

zation, and memory. I am including organization and memory under a broader conception of the term "comprehension" than he uses. I do not at all differ from him in the setting up of these objectives. Undoubtedly we must teach children to classify and subordinate the items or topics about which they read. This is where training in silent reading merges into teaching how to study. Accordingly, long selections rather than short, choppy ones will serve the purpose of rapid reading drills, the analysis of paragraphs, and the organization of materials.

In the seventh place, our ideal readers will have certain helps for conducting the training in silent reading. Not infrequently a piece may be preceded by a statement of one or more problems. As I have already indicated, appropriate tests should follow the presentation of much of the silent-reading material. These tests should be included in the book. It goes without saying that the book should be equipped with a first-class index and table of contents. There should be some sectional and paragraph headings. Finally, a teacher's manual should accompany the series and in it additional equipment in the way of tests, problems, and methods of teaching should appear. The approach to each piece would here be indicated—both the preparation designed to forestall those difficulties which are so fatal to smooth and rhythmical reading, and that thought preparation which will give the proper mental and emotional set so that pupils will attack the reading with vigor and success.

I believe with reference to reading as a school subject, modern investigation and the modern point of view have exalted the importance of the textbook. We see clearly that if we are to lead children to an easy mastery of the printed material and if we are to accomplish this task with despatch, the assistance of the right kind of reading matter is imperative. I have tried to show certain shortcomings of the usual reading text and to point out some of the ways in which I think improvements will take place. With a little more vision and a little more courage on the part of authors and publishers a great deal may be done, along the lines I have indicated, to furnish a worthy answer to the important question, What should children read in school?

AN ANALYSIS OF PUPILS' ERRORS IN FRACTIONS[1]

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Measurements reveal quite accurately the number of examples in fractions of a given degree of difficulty which pupils, working under specified conditions are able to solve and also the percent of these examples they can do correctly. Measurements, as ordinarily interpreted, however, do not show the cause of failure. Teachers who receive pupils' scores in their original or raw form or converted into class percentiles, T-scores, or B-scores, are informed with a fairly satisfactory degree of accuracy of these pupils' present levels of advancement in learning a subject. These scores do not tell the specific difficulties of individual pupils or of the class, yet such information would serve as an invaluable guide to the teacher. In this paper the results of an effort to analyze out certain types of errors are reported and the writer's opinion concerning the most important use which the teacher can make of tests is suggested.

Last October the writer was requested by the Director of Teacher Training at Ohio University to prepare a set of practice exercises in fractions which might resemble in form the Courtis and Studebaker practice exercises in integers. A set of twelve diagnostic tests was first prepared and given to the pupils of the fifth, sixth, seventh, and eighth grades of the Athens schools, including the University Training School. During the winter seventeen practice tests were also prepared. These cover the four fundamental operations with fractions but not with mixed numbers or decimals. The diagnostic tests were given to the Athens pupils in November and again in April. In the interim the practice tests were used in some schools, for the purpose of measuring the effect of their use. This was done, in a crude fashion, by comparing the gains made by pupils using the

[1] Paper read before the Educational Research Department of the Ohio State Teachers' Association at Cedar Point, June 27, 1923.

practice tests with those made by pupils who did not have the advantage—if any—afforded by the practice material.

The data for this study were derived from the papers of the eighth-grade pupils in one of the Athens schools. They pertain to the four operations with fractions, tested with Numbers 1, 2, 3, and 4 of the diagnostic series. The eighth grade was chosen because it was thought desirable to investigate the errors of pupils when they were near the end of their elementary-school career. I avoided the Training School for this purpose because such unusual school influences as student teachers, demonstration lessons, and many tests may tend to exert an undue effect upon the performances of pupils. In November, 36 pupils tried in the four tests 2,174 examples, of which 663 were wrong; in April, 35 pupils tried 2,305 examples, of which 366 were wrong. In the two testing periods then 4,479 examples were attempted; 1,029 or 23 percent were scored as wrong. Each of the 1,029 incorrectly solved examples was carefully examined in an effort to determine the cause of the pupil's failure or—it might perhaps be better to say—to determine the thing that he did which he should not have done or the thing which he should have done but did not do.

Two hundred and sixty-eight errors were made in addition of fractions in the November papers and 82 in the April testing. Table I shows the distribution of these errors by percents.

The percents merely reveal the relative frequency with which the errors listed occurred in the two sets of papers. As indicated by the last line of the table, the absolute numbers of errors was very greatly reduced, the percent right being 49 in November and 89 in April. The errors are named and illustrated with the hope that the illustrations may seem helpful in defining the errors.

In both of these groups of papers the chief fault seemed to be that the wrong operation had been performed. Instead of adding, pupils subtracted, multiplied, or divided. Of these three operations, multiplication seemed to be the one most commonly performed. Possibly a confusion of + and × signs was a cause. The majority of instances of this error occurred in the papers

TABLE I. ERRORS IN ADDITION

Types of Errors	Examples	Percents	
		November	April
Wrong operation performed	$^2/_3+^3/_5=^6/_{15}$	44.9	40.2
Denominators added	$^1/_2+^2/_5=^3/_7$	30.4	1.2
Error in computation	$^3/_4+^2/_5=^{10}/_{20}=^4/_5$	13.6	22.0
Failures to convert addends to the common denominator	$^2/_3+^3/_8=^{19}/_{24}$	1.1	6.1
Failure to record denominator of sum	$^1/_2+^2/_5=9$	2.3	0.0
Failure to reduce answers to mixed numbers	$^2/_3+^1/_2=^7/_6$	1.1	3.7
Failure to reduce answers to lowest terms	$^1/_6+^1/_2=^4/_6$	2.3	2.4
Miscellaneous	.....	1.9	20.7
Unknown	.....	2.3	3.7
Total		99.9	100.0
Number of Errors		268	82

of pupils who followed one wrong operation consistently. Some of the pupils, however, performed various wrong operations in the three minutes allowed for the test; while others, although adding most of the time, occasionally subtracted, multiplied, or divided. Possibly practice exercises in which the four operations are mixed would help in eliminating this error.

As an example of the extent to which pupils occasionally mix wrong operations in a single test, let us consider a specific case. One paper in addition showed clear evidence of both multiplication and division, the two operations frequently occurring in consecutive examples, as shown by these: $\frac{5}{6}+\frac{5}{12}=\frac{1}{2}$; $\frac{2}{3}+\frac{3}{5}=\frac{6}{15}$. This pupil tended to divide where division without remainder was possible, as shown by the former of the two examples. The only right answer on the page was surely gotten by chance. It occurred in this example: $\frac{1}{3}+\frac{1}{6}=\frac{1}{2}$.

The unfortunate practice of adding denominators, although common in November, had almost been eliminated by April. Errors in computation, although decreasing in number, became relatively more frequent in the interval between the two tests. Other errors, *Failure to convert both addends to the common denominator, Failure to record the denominator of the sum, Failure to reduce answers to mixed numbers,* and *Failure to re-*

duce answers to lowest terms, occurred with the frequencies stated, but none was very numerous.

The *Miscellaneous* group, includes a few errors occurring usually in only one paper. In the November tabulation this group includes but two errors, namely, "Writing the correct numerator of the sum and putting 1 over it," as $\frac{5}{6} + \frac{5}{12} = \frac{1}{15}$, and "Failure to use the common denominator," as $\frac{1}{2} + \frac{2}{5} = \frac{7}{5}$.[2] The former occurred three times and the latter, twice. In the April tabulation there are three errors in this group. Failure to use the common denominator occurred once; Canceling denominators, once; and Subtracting denominators, 15 times in one paper. This last item accounts for the large percent in the miscellaneous group of the April column.

A few had to be tabulated as *Unknown*; six from the November testing and three from the April testing are so listed. Possibly a more astute observer could have detected the error in each of these cases. One of the most gratifying features of the experiment, however, was the small number in this group. Naturally, the extent to which a teacher can be helpful to a pupil is conditioned upon the extent to which she can "spot" his troubles. If 97 percent of them can be located from his papers, surely practically all of them can be found when one has the pupil himself, as well as his written work, present.

It frequently seems impossible at first glance to find some errors and one is tempted to place them hastily in the "unknown" class. Consider this example: $\frac{2}{3} + \frac{3}{5} = \frac{1}{19}$. The correct sum, of course, is $\frac{19}{15}$ or $1\frac{4}{15}$. Possibly the pupil had correctly added the fractions, doing the work mentally, and simply set down for his answer the reciprocal of the numerator of the sum. This hypothesis was strengthened by the fact that there were in the same paper two more just like it, $\frac{5}{6} + \frac{5}{12} = \frac{1}{15}$ and $\frac{1}{3} + \frac{1}{6} = \frac{1}{3}$, and six in which only the numerator of the sum was recorded, as $\frac{3}{4} + \frac{3}{16} = 15$. In each of the nine examples

[2] In this example the pupil has evidently converted the $\frac{1}{2}$ to $\frac{5}{10}$, added numerators without converting $\frac{2}{5}$ to tenths, and then, for the denominator of the sum, has copied the denominator of the second addend. He has also failed to reduce his answer to a mixed number.

attempted in this manner, the computation was correctly done. The pupil's score was 9-0, nine attempted and zero right. A little skillful analysis and individual instruction should clear up the whole matter.

One VIII-B boy scored in addition 20-0 (i.e., 20 attempted and none right). An examination of his paper soon showed that he had divided; and as division 19 of the 20 examples were correctly done. The same boy scored 12-12 in subtraction, 18-16 in multiplication, and 14-8 in division where he multiplied five times.

Another interesting case, an VIII-B girl, scored in addition 24-0—there were but 24 examples on the page. She multiplied in each case. In subtraction she scored 11-10, in multiplication, 19-14, and in division, 16-9. Most of her errors might have been avoided through a little reflection and care. Frequently she failed to reduce her result. She was caught on this type also, $3 \times \frac{3}{4} = \frac{4}{9}$.

Another VIII-B girl scored in addition 24-0. In each case she added denominators. In subtraction, she scored 15-1, subtracting denominators and getting one right by chance, $\frac{2}{3} - \frac{2}{3} = 0/0$. In multiplication her score was 22-22 and in division, 17-13.

Table II gives the percentage distributions of the errors in subtraction. From this table it will be seen that 112 errors were made in November by 36 pupils, while in April 35 pupils made 77 errors.

TABLE II. ERRORS IN SUBTRACTION

Types of Errors	Examples	Percent	
		November	April
Wrong operation performed	$\frac{2}{3} - \frac{1}{2} = \frac{4}{3} = 1\frac{1}{3}$	12.5	0.0
Denominators subtracted	$\frac{3}{4} - \frac{2}{3} = \frac{1}{1} = 1$	50.0	28.6
Errors in computation	$\frac{5}{8} - \frac{1}{3} = \frac{6}{24} = \frac{1}{4}$	10.7	33.8
Failure to use the common denominator	$\frac{1}{2} - \frac{2}{5} = \frac{1}{5}$	6.3	11.7
Failure to reduce the answers to lowest terms	$\frac{7}{8} - \frac{1}{8} = \frac{6}{8}$	10.7	26.0
Miscellaneous		0.9	0.0
Unknown		8.9	0.0
Total		100.0	100.1
Number of Errors		112.	77

Aside from the single occurrence of an error listed as *Miscellaneous*, only five types of errors were recognized in subtraction. Subtracting denominators, distinctly the worst fault of the class in November, seems to be found to an annoying degree in April, although both relatively and absolutely it has been considerably reduced. The data of the table, however, may be misleading, for the 22 occurrences of this error in April were all found in one paper. Comparing the first item of Tables I and II, it will be noted that the pupils did not tend to perform the wrong operation in subtraction nearly so frequently as in addition. The only explanation which I can advance for this is the serious confusion of addition and multiplication, already referred to.

There were more instances of errors in computation in April than in November, absolutely, and, of course, relatively. It was frequently apparent to the examiner that a more adequate degree of skill in the four fundamental operations with integers would have meant larger rate scores and considerably larger accuracy scores.

From Table II it will be seen that a large number of errors were due to *Failure to reduce the answers to lowest terms*. This error occurred four times as frequently in the subtraction as in the addition tests. The right of a teacher to call this an error may be correctly questioned. Surely this is the least serious error in the list. In order that the scoring of the tests may be easily done, only one answer could be accepted for each example.

The utter inadequacy of the knowledge of fractions which some eighth-grade pupils possess may be well illustrated by a detailed account of the score of one VIII-B girl in subtraction. Her score was 12-0. In the first two examples, she quite evidently subtracted both the numerators and the denominators, $\frac{5}{6}-\frac{1}{4}=\frac{4}{2}$ and $\frac{5}{8}-\frac{1}{2}=\frac{4}{6}$. The third, $\frac{7}{8}-\frac{9}{16}=\frac{7}{8}$, is a more difficult case. The only clue is that 16 had been written in pencil on the 9. She probably subtracted denominators, then inverted the subtrahend and subtracted numerators, making an error in computation. The fourth and fifth, $\frac{3}{4}-\frac{3}{16}=\frac{1}{16}$ and $\frac{1}{2}-\frac{3}{16}=\frac{3}{4}$, were scored "Unknown." At this point the pupil

evidently recalled that she had been taught something about cancellation. She did this example, $\frac{3}{8}-\frac{1}{6}=\frac{1}{6}$, by canceling the 3 into the 6 and then evidently subtracting the denominators for the denominator of the answer. She used the one remaining digit in the numerators for the numerator of her answer, of course failing to understand that the 3 of $\frac{3}{8}$ had been displaced by 1. Then in this example, $\frac{7}{12}-\frac{1}{3}=\frac{7}{1}$, the 3 was canceled into the 12, 4 written beneath but ignored in writing the answer. Some recollection of having inverted something while performing some operation with fractions must have pushed to the foreground of consciousness at this time, for in the example, $\frac{5}{6}-\frac{5}{12}$, she availed herself of the very excellent opportunities for canceling but wrote the result $\frac{2}{1}$. One may easily guess at what was done in $\frac{2}{3}-\frac{3}{5}=\frac{2}{5}$, but the source of the denominator in the answer of $\frac{1}{3}-\frac{1}{6}=\frac{2}{3}$, where the second fraction was inverted and the digits rewritten, $\frac{1}{3}-\frac{6}{1}$, before cancellation was indulged in, is hard to determine. This example, $\frac{7}{8}-\frac{3}{4}$, was rewritten, $\frac{7}{8}-\frac{4}{3}$, canceled, and the answer $\frac{7}{5}$ ingeniously arrived at by multiplying numerators and adding denominators. In $\frac{1}{2}-\frac{1}{4}=\frac{2}{4}$, the 4 has been rewritten on the 1, canceled, but restored to the denominator in writing the answer.

Another girl with the score, 12-0, subtracted denominators for three examples and then performed the operation of division perfectly, rewriting the second fraction, cancelling, and multiplying. These two processes were alternated through the remainder of her work.

Table III shows the percentage distribution of errors in multiplication. The leading errors, *Wrong operation performed*, *Error in computation*, and *Failure to reduce answers to lowest terms*, were prominent in the two operations already discussed and so need no further comment. The striking feature of the table is the large number of cases, 24 or 27.9 percent, grouped as "miscellaneous" in the April tabulation. Twelve, or one-half of these, were cases of evident confusion with addition, as shown by the example, $\frac{3}{4}\times\frac{3}{16}=\frac{36}{16}$. Evidently the $\frac{3}{4}$ was mentally

TABLE III. ERRORS IN MULTIPLICATION

Types of Errors	Percent	
	November	April
Wrong operation performed	33.8	9.3
Error in computation	21.5	16.3
Failure to reduce answers to lowest terms	23.9	16.3
Failure to reduce answers to improper fractions	7.7	1.2
Denominators added	3.9	9.3
Denominators canceled	1.5	5.8
Integral multiplier and multiplicand treated as reciprocal	1.5	7.0
Miscellaneous	0.8	27.9
Unknown	5.4	7.0
Total	100.0	100.1
Number of Errors	130	86

changed to $^{12}/_{16}$, the numerators multiplied and the product, 36, placed over the common denominator, 16. Eight of the 24 in this group were cases of "Disposing of answers whose numerators are 1 as integers," as $1/\not{3} \times \not{3}/8 = 8$.

In the November testing the percent right was much higher in multiplication than in the other three operations. The reason seems clear. Pupils who know little or nothing of the process are likely, when confronted with a test in addition of fractions, to add numerators for a new numerator and denominators for a new denominator. This, of course will not yield right answers; nor will similar procedures in subtraction and division. But in multiplication the case is different. Those whose responses are solely determined by the familiar signs of aggregation are likely to make only three errors in multiplication, namely, *Error in computation, Failure to reduce answers to lowest terms,* and *Failure to reduce answers to mixed numbers,* errors 2, 3, and 4 of Table III. Pupils, therefore, who possess a very limited knowledge of the operations with fractions may make rather high scores on the third test.

Pupils who make good scores will occasionally lapse. One, whose score in multiplication was 20-18, added denominators in the two wrong examples, in one case after canceling. These were the examples: $\not{3}/8 \times 1/\not{6} = 1/10$; $1/2 \times 1/8 = 1/10$.

TABLE IV. ERRORS IN DIVISION

Types of Errors	Percent	
	November	April
Wrong operation performed	27.4	35.5
Errors in computation	14.0	21.3
Failure to reduce answers to lowest terms	3.8	1.4
Failure to reduce answers to mixed numbers	8.9	3.5
Treating integral divisor or dividend as reciprocal	1.9	4.3
Denominators added	3.8	3.5
Dividend, instead of divisor, inverted	5.7	2.8
Denominators or numerators canceled	4.5	3.5
Miscellaneous	4.5	9.9
Unknown	25.5	14.2
Total	100.0	99.9
Total number of errors	157	141

Little comment is required on Table IV, which contains the percentage distributions of errors in Test 4, division. *Wrong operation performed* is again a prominent error. *Errors in computation* occur rather frequently, but the outstanding feature of the table—and the unfortunate one, it may be added—is the large percentage of errors listed as "Unknown," particularly in the November tabulation. In about one wrong example out of five in this operation, the writer was unable to detect the cause of the error.

Summary and Conclusions

In 91.3 percent of the cases, it was possible to detect the causes of the errors of eighth-grade pupils in taking tests in the four fundamental operations with common fractions. Most of the errors may be ascribed to three causes: (1) inadequate conception of the processes involved; (2) confusion of the operations; and (3) lack of an adequate degree of skill in the fundamental operations with integers.

The information collected from the experiment and other sources indicates that a far more satisfactory degree of skill may be produced in pupils through the detailed analyses of their faults and through systematic drills in the form of practice exercises.

SIZE OF CLASS AND SCHOOL EFFICIENCY

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In the spring of 1922 the Grand Junction High School was asked by the North Central Association of Colleges and Secondary Schools to participate in an experiment concerning the relation of the size of classes to school efficiency. The purpose of the experiment was to ascertain, if possible, whether the size of a class has any appreciable effect upon the knowledge the pupils acquire and the work they do.

The only requirements made by the North Central Association were that the experiment must be conducted in at least three classes, all of which must be taught by the same teacher and all of which must cover the same work. The size of the classes was to be approximately forty, twenty-five to thirty, and less than twenty. The pupils, as nearly as possible, were to be selected without regard to their intelligence scores.

The North Central Association provided no particular plan and no particular tests. We were therefore left to conduct the experiment in our own way. Accordingly, in the fall of 1922, we planned the project for the junior English classes, and organized three of these classes as follows: No. 1 with 20 pupils; No. 2 with 34 pupils; and No. 3 with 44 pupils.

We selected the pupils for each class with no thought of their intelligence quotients. Some four weeks after school began, however, we gave them the Terman Group Test of Mental Ability and computed their intelligence quotients. We then found that the medians for the intelligence quotients varied only a fraction of one percent. The first and third quartiles were also nearly the same for all three classes.

After thoroughly establishing our classes, our method of conducting the experiment was merely to proceed with the year's

work in the usual way, except that we found it necessary to depend rather more than usual on test grades, because the number of pupils in the large class made it impossible for each pupil to make many daily recitations each period.

The work covered grammar, composition and theme work, notebook work, book reports on outside readings, and various phases of American literature—such as its history, a detailed study of the lives of certain authors, and a study of some of their works.

The tests given were of the following types: standard tests in grammar and English, special tests in grammar, general information tests, completion and one-word tests on the various phases of American literature, and general tests on outside readings.

Under the direction of the North Central Association the experiment was to run for a period of nine weeks. At the end of the nine weeks, however, we felt that we had really just started; and the experiment was becoming so interesting that we decided to continue it throughout the year.

Grammar and English

The first sextile period (one-sixth of the school year) was devoted to the study of grammar. Table I shows the results of the various tests in grammar and English given in that period and throughout the year. The first test was Starch's Grammar Test, but it was conducted and scored merely as an information test. In this the middle group stood highest with the small group a very close second. The large group was several points behind.

The Special Test on Clauses was a test in analyzing sentences, after several days' drill on clauses. In this test, as will be seen by reference to the Table I, the small group stood a number of points ahead of the others. These two tests would seem to show that for work of this type the small section is better. On the other hand, the results of the Kirby Grammar Test, which appears to be much the same type of test, would seem to indicate that the size of the class has practically no influence on the result.

The Monroe Silent Reading Test was given at the end of the year after the pupils had spent nine months in the classes of different sizes. The result was decidedly in favor of the small class, but since this particular phase of English was not stressed during the year, it seems hardly fair to say that the size of the class was responsible for the result. The same would apply to the Carr Vocabulary Test which gives the preference to the middle-sized class.

TEST I. GRAMMAR AND ENGLISH STANDARDIZED TESTS

Test	Medians			Upper Quartiles			Lower Quartiles		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
1. Starch Grammar I	89.2	90.9	83.5	94.7	95.5	92.7	81.3	81.8	68.1
2. Special Test on Clauses	67.0	62.0	63.0	88.7	77.5	71.5	53.0	47.0	48.8
3. Kirby Grammar									
Sentences	37.3	38.8	37.6	40.1	40.9	39.8	35.6	37.1	35.9
Principles	32.9	35.3	35.3	39.3	38.5	38.6	31.4	30.3	31.3
4. Monroe Silent Reading									
Rate	131.9	120.4	120.4	133.6	130.9	123.4	123.1	100.5	101.6
Comprehension	51.9	43.8	43.1	59.4	50.4	49.4	43.8	31.3	35.0
5. Carr Vocabulary	31.5	36.0	33.5	41.5	40.3	40.0	23.0	30.3	27.5

On the whole it seems that for work of the grammar type—that is, work where the knowledge must be gained by the pupil's personal efforts, and not so much through class discussions—the greater advantage to the pupil lies in the small class.

American Literature

In our Junior English in the Grand Junction High School the larger part of the year is devoted to the study of American literature. In this we study the history of American literature, the lives of the most prominent American authors, and representative works from American authors. The pupils are required to keep notebooks on this subject and are frequently examined on them. In Table II the first item is notebooks. The third quartile of the notebook grades is decidedly in favor of the small class, but in all other respects there is very little difference. During the year three general information tests were

TEST II. AMERICAN LITERATURE STUDIES

Test	Medians			Upper Quartiles			Lower Quartiles		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
1. Notebooks	81.9	78.3	79.3	87.8	82.7	83.5	74.6	75.1	76.2
2. General Information I	67.5	76.3	72.1	80.8	86.3	79.1	53.8	66.6	64.4
II	81.6	88.9	83.5	92.5	93.5	91.8	68.3	77.9	73.5
III	78.5	79.5	83.3	89.3	89.4	92.0	68.8	67.4	75.0
3. One-word Test in American Literature	80.5	88.2	88.0	86.3	93.6	92.0	74.4	81.3	77.5
4. Special Tests—									
Memory (Quotations)	87.5	81.7	77.5	94.1	89.6	83.8	79.4	74.4	70.8
House of Seven Gables	72.5	78.9	81.8	79.4	87.8	86.1	63.6	70.8	74.5
Bryant and Poetry	78.8	84.6	77.8	84.8	92.3	87.0	65.6	76.9	69.0
Great American Poets	73.3	77.5	71.9	80.0	90.0	83.4	65.0	69.0	62.7

given covering everything in American literature up to the time of the test.

In the first two of these tests the preference seems to be very decidedly for the medium-sized class, and decidedly against the small class, while in the third the result is quite decidedly in favor of the large class. In the one-word test in American literature and in the test on *The House of Seven Gables* the medium-sized classes obtained the best results with the large class at about the same level and the small class appreciably lower. The two tests on poets and poetry favor the middle-sized class, while the memory test, on material not open for class discussion, yielded best results for the small class, and poorest for the large class.

The results of this division of the year's work seem to indicate that in types of work where a very large percent of the pupil's knowledge is gained through class discussion, the larger the class the better the discussion and the larger the pupil's store of knowledge. On the other hand, in types of study where individual work and drill is necessary, such as in memory work, the small class appears to be better.

Outside Reading

Another important part of our third-year English work is the outside reading. Each pupil is required to read and report

on six books aside from those studied in class. Three of these were reported on by written examinations. The other three were oral reports made individually at various times throughout the year. In Table III the results of the three written reports are tabulated. The preference varies, perhaps in direct

TABLE III. OUTSIDE READING

Book	Medians			Upper Quartiles			Lower Quartiles		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Tales of a Traveller	83.9	80.0	78.5	92.2	89.3	91.5	81.9	69.1	65.1
Lorna Doone	82.5	82.5	80.1	87.2	89.6	86.4	72.5	72.3	71.2
Autobiography	69.1	72.0	73.3	80.4	84.2	83.0	60.9	66.7	62.5

relation to the time of taking the tests, for it is very hard for the teacher to look on these examinations from exactly the same point of view when they must be taken from one to two months apart. However, these results seem to indicate practically the same thing that the rest did, namely that the size of the class has very little influence on the pupils.

Periodic and Final Grades

Table IV gives the medians for each of the sextile grades, and the final averages for each class. In this the results are very close. The medium-sized class has a slight advantage in the first, fourth, and fifth sextiles and in the final average, while the large class has the advantage in the third and sixth sextiles, and the small class only in the second sextile.

TABLE IV. SEXTILE AND FINAL GRADES

Sextile	Small	Medium	Large
I	76.2	77.8	73.3
II	80.	77.8	76.5
III	79.	79.25	80.5
IV	78.5	82.9	79.8
V	78.3	80.	77.8
VI	79.4	80.3	81.7
Average	79.2	79.4	78

General Comment

In general, we feel that English is not the most suitable subject in which to conduct an experiment of this sort because most of the work is of the discussion type—the type in which the pupil acquires a great deal of his knowledge from the contributions of his fellow pupils. Consequently, the larger the class the larger the opportunity for a variety of discussion. I feel, however, that there is a decided drawback even to this side of the question. I found that in the small class no one was afraid to express his opinion, while in the large class there were at least ten pupils who never voluntarily offered an opinion. Often when called upon they would say, "I don't know," rather than "face the crowd." Several pupils in this class failed, we believe, very largely because of the lack of opportunity for more individual attention than it was possible to give them in a class of forty-four.

Another part of the English work which was very difficult under this experiment was the work in composition. Written work for the class of nineteen could be discussed very easily, but it was quite a different problem in the class of forty-four. In the case of oral compositions, twelve is about the average number possible during a period of forty-five minutes. Thus for the large class it was necessary to devote four days to oral composition in order to get around the class once, while a day and a half was plenty for the small class. Therefore a small class could do more work along this line.

Looking at the results of this experiment as a whole, as carried on in the Grand Junction High School, it would seem that a class of thirty is the ideal size. Several other factors, however, entered into the experiment, which do not show in the tables. For example, the percent of boys varied in the different classes. In the class of 44, there were 21 boys—practically fifty percent of the class. In the small class, 9 were boys, again almost fifty percent. But in the medium-sized class only 12, or about one-third, were boys. It is generally recognized that boys do not take the interest in English that girls do. This fact might therefore help to throw the advantage to the medium-sized class.

Another factor which I feel sure influenced the results was the fact that in the small class there were four repeaters who had failed the year before not because of lack of ability, but because of lack of ambition. These made up more than twenty percent of the class; and while this might not have been noticeable in a class of 40, it was decidedly noticeable in a class of 19.

We are planning to carry on this experiment in a different type of class next year to see if the results are not more definite in work which depends more largely on the individual pupil.

THE SELECTION OF TASKS OF EQUAL DIFFICULTY BY A CONSENSUS OF OPINION[1]

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The purpose of this paper is to present measurements of the extent to which a ranking of tasks for difficulty corresponds to their ranking by the percentages of a group who fail at the several tasks. The matter is of practical importance because any means of avoiding or lessening the labor of obtaining such percentages of success and failure for thousands of tasks or test-elements will be of great value in test construction and arrangement. It is of theoretical importance because the closeness of correspondence between (a) an average of subjective estimates of difficulty of a task based upon many, various, and unknown notions of what difficulty is and (b) the objective results from testing a group with that task, is an indication of the extent to which tasks do possess varying amounts of some fairly unitary thing which puts them into a graded series of difficulty in general.

The experiment consisted in having each one of forty teachers or graduate students of psychology and education rate the hundred tasks listed in Table I according to the instructions quoted below, and in obtaining records of actual achievement with these tasks by city pupils in grade IX. The rating system was made very simple so that the forty individuals needed to spend only a moderate amount of time, in return for which each received a measure of his accuracy of judgment. The pupils in grade IX were not the same for all the hundred tasks, it being necessary to take any available material where the population was a random selection of ninth-grade pupils and was large, and where the conditions of the test allowed time enough so that failure meant inability to do the task little complicated by lack of the speed needed to reach it. The ninth-grade groups used are indicated in Table I.

[1] The investigation reported here is one of a group made public by a grant from the Carnegie Corporation.

TABLE I. THE HUNDRED TASKS AND THE GROUPS USED

Tasks	Examination	Form	Test	Elements in Order of Presentation	Schools	No. of Pupils
1– 10	I. E. R. Sel[a]	A	4	3, 6, 10, 9, 1, 5, 7, 2, 8, 4	4–11	1115
11– 20	I. E. R. Sel	B	4	5, 9, 1, 6, 2, 10, 8, 7, 4, 3	2	1225
21– 30	I. E. R. Sel	A	1	7, 1, 3, 9, 10, 2, 4, 6, 5, 8	4–15	3174
31– 40	I. E. R. Sel	B	1	3, 4, 1, 10, 9, 6, 7, 2, 8, 5	2	1225
41– 50	I. E. R. Sym[b]	A	4	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	3	386
51– 60	Trabue Comp[c]	K, M	.....	K 5, 3, 1; M 5, 1, 4, 2; K 2, 4; M 3	4–15	3172
61– 70	Trabue Comp	L, J	.....	L 2, 4; J 1; L 5, 1; J 4, 3, 2; L 3; J 5	2	1225
71– 82	Thorndike Reading[d]	Q	III, V, VI	III–4, 1, 2, 6, 5, 3; V–6; VI–1, 2, 3; V–4, 5	3	386
83–100	Thorndike–McCall Reading	2	.....	23, 21, 34, 35, 27, 28, 29, 15, 17, 18, 30, 31, 32, 33, 19, 20, 25, 26	Various	3413

[a] "I.E.R. Sel." means the Institute for Educational Research Test of Selective and Relational Thinking.
[b] "I.E.R. Sym." means the Institute for Educational Research Test for Ability with Symbols. The ten items used here are from the Carnegie Institution Reading Test.
[c] "Trabue Comp." means the Trabue Completion Tests.
[d] An unpublished reading test.

The easiest of the tasks were such as:

2. Write a word that means the opposite of *white* and begins with *b*.
5. Write a word that means the opposite of *good* and begins with *b*.
8. Write a word that means the opposite of *front* and begins with *b*.

The hardest of the tasks were such as:

Read this and then write the answers. Read it again if you need to.

COLERIDGE

I see thee pine like her in golden story
Who, in her prison, woke and saw, one day,
The gates thrown open—saw the sunbeams play
With only a web 'tween her and summer's glory;
Who, when the web—so frail, so transitory,
It broke before her breath—had fallen away,
Saw other webs and others rise for aye,
Which kept her prisoned till her hair was hoary.
Those songs half-sung that yet were all divine—
That woke Romance, the queen, to reign afresh—
Had been but preludes from that lyre of thine,
Could thy rare spirit's wings have pierced the mesh
Spun by the wizard who compels the flesh,
But lets the poet see how heav'n can shine.

95. Copy the first word of the line which implies there has not been a continuous stream of like songs.

.....

96. Complete the following with one word only:
"Those songs" really means those.....

The following instructions were provided for the guidance of those who rated the tasks:

INSTRUCTIONS FOR THE EXPERIMENT IN ESTIMATING THE AMOUNT OF INTELLIGENCE REQUIRED BY CERTAIN TASKS

Examine the 100 tasks and rank each according to the amount of intelligence which you think is required in order to give the right response, assuming that an individual has been brought up in this country in an English speaking home and has had opportunity to go to school for at least eight years. (Eight years means eight years, not eight grades.) There are five kinds of tasks as shown on the accompanying sheets. Assume that the individual has 2 minutes for each task, except those in paragraph reading, and that he there has 2 minutes per task *plus* time enough to read the paragraph carefully twice.

You will assume that in each case the person taking the task has read instructions such as those shown on the accompanying sheets. These are of course not reprinted on each slip. When a single word is on the slip you will understand that the task is to write a word that means the opposite and that begins with the letter written before the word. When the task is to select the right answer to a question about a paragraph, the paragraph is not reprinted on each slip, but is indicated by the word written before the question. The paragraphs are given on the inclosed sheets for convenient reference. The same plan is followed for the tasks of answering questions about the "Coleridge" and "Lewis Carroll" paragraphs.

First sort them out roughly into piles, putting the tasks that require least intelligence at one end, those that require the most at the other end, and putting the others into piles in between according to the amount of intelligence that each requires. Make as many piles as you find you can distinguish. Those in one pile are to be alike in amount of intelligence required. One pile may have only one task in it, another may have a dozen.

Then re-examine them pile by pile, changing any task to a higher or lower pile if it seems best, and splitting any pile into two or more piles if it seems best. Examine the record sheet inclosed herewith. It is a list of the tasks identified by the numbers on the front of the slips at the left end. Then take your "least intellect" pile and record on the record sheet a figure 1 after each task that you put in this pile. Then take your "next to least" pile and record on the record sheet a figure 2 after each task that you put in this second, or "next to least" intellect,

TABLE II. DATA ON ESTIMATES OF DIFFICULTY

Tasks:		*2*			*8*			*3*			*6*			*1*			*15*			*13*	
5	2	37	1																		
2				13	27	0	17	23	0												
8							10	21	9	6	31	3									
3										10	20	10	8	23	9	13	17	10	14	17	9
6													5	30	5	8	28	4	7	32	1
1																6	30	4	8	28	4
15																			5	31	4
Average of Tasks 2, 3, 1, 15, and 13	15	*22* 12	13	17	*19* 18	5	18	*7* 18	4	20	*14* 15	5	21	*10* 15	4	22	*20* 15	3	23	*23* 8	9
	23	*63* 9	8	23	*26* 7½	9½	24	*37* 8	8	24½	*31* 9½	6	26½	*25* 5½	8	26	*36* 8	6	27	*32* 6	7
	26½	*53* 8	5½	27	*40* 7	6															
Average of Tasks 25, 26, 32, and 53	17	*9* 6	17	16	*38* 9	15	19	*4* 4	17	18	*11* 6	16	16	*58* 11	13	18	*27* 8	14	17	*33* 10	13
	21	*18* 5	14	18	*52* 11	11	19	*39* 11	10	23	*92* 5	12	23	*91* 5½	11½	22	*65* 9	9	22	*29* 9	9
	23	*68* 8	9	24	*17* 6	10	24	*55* 6	10	24	*21* 7	9	25	*98* 5	10						

TABLE II (*Continued*)

Average of Tasks 68, 17, 55, 21, and 98		*90*			*28*			*57*			*34*			*24*			*67*			*97*	
	17	6	17	18	7	15	16	11	13	19	6½	14½	18½	7	14½	18	9½	12½	19	8½	12½
		61			*99*			*84*			*100*			*83*			*59*			*35*	
	19	9	12	20	7	13	21	7	12	21½	6	12½	21	8	11	20	10	10	22	8	10
		16			*62*			*12*			*30*			*69*			*64*			*42*	
	24	7	9	23	8½	8½	25	8	7	25	8	7	27	8	5	29½	5½	5	31	4	5
		87			*66*			*60*			*70*										
	31	4	5	30½	5½	4	31	5	4	31	5	4									
Average of Tasks 42, 87, 66, 60, and 70		*56*			*54*			*88*			*89*			*51*			*41*			*85*	
	17	10	13	18	10	12	18½	9½	12	21½	9½	9	23	8½	8½	26½	6	7½	27½	5	7½
		78			*47*			*86*			*45*			*50*			*48*			*46*	
	28½	4	7½	28½	4	7½	28½	5	6½	29	5	6	31	3	6	31	3	6	31½	2½	6
		49			*79*			*44*			*71*			*75*			*43*			*72*	
	31½	3½	5	32½	2½	5	33	3	4	34	2	4	34	2	4	34	2½	3½	34	2½	3½
		73			*80*			*74*			*76*			*81*			*82*			*96*	
	34	3	3	35½	1½	3	35½	2	2½	36	1	3	36	2	2	36	2	2	36	2	2
Average of Tasks 81, 82, and 96		*93*			*95*			*94*			*77*										
	17	9	14	18	10½	11½	20	9	11	19	15	6									

pile. Continue until you have made an entry of 3 for each task in the third pile, an entry of 4 for each task in the fourth pile, and so on.

Sign the record sheet and return it and the tasks to E. L. Thorndike, Room 332, Teachers College, or Teachers College Post Office. A second record sheet is inclosed in case you wish to keep a copy of your ratings. A report of how accurately you judged the amounts of intelligence required will be sent to you. Nobody else will be informed concerning it.

The subjective ratings were transmuted into a rank order for imputed difficulty by virtue of the facts of Table II.[2] In this table, each comparison comprises three numbers, which sum to 40, giving the number of judges that rated the task noted at the left as easier than, equal to, or harder than the task noted above. Thus 2 rated 5 as easier than 2, 37 rated 5 equal to 2, 1 rated 5 harder than 2. After the eight easiest tasks, all others are put in comparison with several tasks and the average is taken.

The objective percents of failure were transmuted into a rank order for observed frequency of error, assuming that the groups of pupils were of equal ability. The two rank orders—those arising from the subjective ratings and those from the percents of failure—appear in Table III. The effect of the errors in this procedure is all toward attenuating the correlation. The true correlation between difficulty estimated by a large and competent consensus and percentage of failure in a large ninth-grade group will, then, be higher than that obtained from the two rankings of Table III. The correlation obtained by $r = 2\sin\left(\frac{\pi}{6}\rho\right)$, where $\rho = 1 - \frac{6\Sigma D^2}{n(n^2-1)}$, is .88. The true correlation may then be estimated as at least 0.92; and the probable error of estimate of objective difficulty by a fairly competent consensus may be taken to be under two-fifths of the median deviation of the objective difficulties of the sample tasks used.

The concept of difficulty, then, has a certain unity of meaning in the mind of psychologists; and there is justification for

[2] In doing this, judgments that two tasks were of equal difficulty were divided, half + and half —. This is not the best procedure, but it is adequate for our purpose.

TABLE III. THE RANK ORDER OF 100 TASKS BY ESTIMATED DIFFICULTY AND BY PERCENTS OF FAILURE

(1 = Easiest 100 = Hardest)

Task	Rank by		Task	Rank by		Task	Rank by	
	Estimates	Percents of Failure		Estimates	Percents of Failure		Estimates	Percents of Failure
1	5	10	36	22	27	71	88	61
2	2	1	7	18	32	2	88	75
3	5	32	8	29	7	3	88	93
4	29	68	9	34	47	4	92	87
5	1	2	40	22	19	5	88	71
6	5	4	41	74	91	76	92	71
7	11	40	2	66	86	7	100	91
8	3	3	3	88	78	8	76	54
9	22	43	4	85	57	9	84	88
10	15	45	5	79	84	80	92	89
11	29	46	46	81	63	81	95	95
2	60	91	7	76	65	2	95	94
3	8	9	8	81	66	3	55	49
4	12	7	9	83	77	4	55	42
5	7	19	50	81	80	5	76	97
16	59	71	51	73	85	86	78	100
7	40	56	2	33	54	7	66	40
8	29	52	3	22	15	8	71	59
9	10	13	4	70	82	9	72	82
20	15	7	5	40	27	90	44	22
21	43	27	56	69	67	91	37	32
2	9	12	7	46	37	2	35	17
3	15	40	8	29	36	3	97	82
4	48	38	9	55	63	4	99	96
5	22	21	60	66	74	5	98	99
26	15	25	61	51	63	96	95	98
7	29	14	2	58	69	7	51	19
8	45	32	3	15	5	8	42	23
9	37	24	4	63	79	9	51	51
30	61	60	5	37	32	100	55	54
31	22	50	66	66	73			
2	22	32	7	48	44			
3	29	32	8	40	16			
4	48	11	9	62	58			
5	55	48	70	66	76			

rating the difficulty of tasks by opinion. Such ratings should, of course, be checked by objective tests; and it may sometimes be cheaper in time and money to give and score tests than to rate them.

PROPOSALS FOR STANDARDIZING MEASUREMENT IN EDUCATION: III. THE PROGRESS INDEX

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The demand upon educational measurement which must now be satisfied is that for an adequate measure of progress conceived as a function of amount and rate of attainment. Such a measure is especially needed in surveying the results of instruction as obtained by different school communities, where the time consumed in getting a given result is of no small importance. When we travel on the railway we estimate the possibilities of progress not only in terms of distance traveled, but also in terms of the rate at which the distance is traversed. Speed and mileage both enter into our calculations. And so, in measuring educational progress, notions of rate as well as notions of amount must figure. From the standpoint of attainment only, the child whose attainment is expressed as b units at the end of n years is on a parity with the child who has attained a proficiency of b units in $n \pm u$ years. The first step, then, in the measurement of progress is obviously the measurement of total attainment, no matter what term of years the gaining of the attainment may cover.

The question arising now is, what unit shall be employed in measuring this total attainment? We cannot, of course, use the crude scores in making up the total, as this would still leave it impossible to compare the results of different tests. The alternatives which present themselves are: (1) a unit based on the variability of a single grade or age group; (2) a unit based on the collective variability of several such groups; or (3) a unit based on the successive variabilities of the several groups involved in the total. The first of these units was devised by McCall in the development of the T-score, which is based on the variability of five hundred unselected twelve-year-olds. The principle of the second measure was adopted by Pintner when he

based his unit on the variability of grades III to VI. We shall discuss the principle of the third sort of unit shortly.

In the comparison of these measures with reference to their fitness for the present purpose, there are two tests which it is useful to apply: First, to what extent is the method serviceable in the use of tests already in the field? Second, how closely does it conform to the fundamental principle of measurement in terms of variability? The first of these tests is not met by either the T-unit or the unit of Pintner, inasmuch as both would require the rescaling of existing tests before a standard unit of measurement could be established. Moreover, in my judgment, neither of these units squares exactly with the fundamental principle underlying measurement in terms of variability.

This principle, as I conceive it, may be stated as follows: *Where an aggregate of individuals is subjected to certain uniform conditions with the result that the individuals show characteristic divergences from the central tendency of the aggregate, the divergences exhibited may be inferred to be due to the operation of causes peculiar to the individual in their effects and measurable in terms of the variability deduced from the aggregate.* Without accurate determination of uniformities in the conditions of experimentation, grounds of inference with respect to causes of individual differences are altogether wanting. In education we are usually concerned with determining the causes of individual differences, the degree of success attending our efforts being dependent on our ability to secure uniform experimental conditions. We lose, it would then appear, something of exactness in measurement when we disregard uniformities of the group environment which are known to exist.

Now the influences, such as factors of growth, social contact, and instructional technique, which affect the accomplishment of one grade or age group cannot be assumed to operate in just the same manner on another group, and especially so when we consider groups removed by several degrees from one another, such as the fourth and eighth grades or the eighth and twelfth years. There is evidence that the rate of physical growth is not

the same from year to year, occasional spurts being followed by periods of slower development. The social instincts, too, do not ripen with uniform acceleration; while it is easily proved that the work prescribed for the several grades does not represent a distribution of equal burdens. When we regard an individual of one age or grade distribution as a variate of another or of several other such distributions, we are neglecting the experimental control of causes of diversity which are common to the group rather than peculiar to the individual.

The effect of differences in variability on the commensuration of measurements is readily seen from a suppositious comparison of the record of John, grade IV and age nine, with that of brother Fred of grade VIII and age thirteen. In proportion as the variability of Fred's group is less than that of John's, it will have the effect of exaggerating John's performance relative to that of his brother; and *vice versa*. Thus, if the variability of John's group be 10 and that of Fred's be 8, a given score of 20 will yield a ratio of variability of 2 when expressed in terms of the first dispersion; but when expressed in terms of the second, it becomes 2.5. To state the records of both brothers in terms of the variability of grades IV to VIII would not alter the situation, for it would be merely to introduce a common denominator which would in no wise affect the disparity between the variabilities of the two groups considered. That is to say, whatever be the relation of the composite variability to the respective variabilities of grades x and y, the effect of measurement in terms of it will be to exaggerate the value of measurements of the grade of greater variability relative to the measurements of the grade of lesser variability.

The third alternative unit to be considered, namely, the unit based on the variabilities of successively ordered groups, seems to me to be most satisfactory for the purpose of measuring total attainment. In fine, when we seek to measure traits of individuals whose differences grow out of a highly complex situation, it is desirable to isolate the important factors affecting these differences and render them constant while we observe suc-

cessively the relation of variations in each factor to variations in the subject. But when we are dealing with masses of the school population, this is usually a practical impossibility. We further the ends of comparison, however, if we regard differences in the variabilities of functional groups as significant of differences in the essential conditions of behavior. The virtual effect of stating the measurement of an individual in terms of the variability of the group whose background of conditions has produced this variability is to equalize the conditions of variability for the several groups under observation. Since this makes for increased control over the conditions of experimentation, we thus facilitate the exact comparison of individual differences as between groups which are functionally distinct.

Regarding single grade or age groups as distinguished by characteristic marks, we may speak of them as the integral components of the educational progression, and the unit based on the several variabilities of successive groups as an *integral* variability unit to distinguish it from the *unique* variability unit of McCall, or the *composite* variability unit of Pintner. The uniform scale of Chapman is in reality based on integral variabilities, though he himself seems to regard a composite unit as equally acceptable.

Concretely put, the integral unit measures the abilities of members of group *a* in terms of the variability of group *a*, and the abilities of members of groups *b* and *c* in terms of the variabilities of groups *b* and *c* respectively. With measurements referred to standard norms, we can now make a simple statement of the total attainment of any school community with respect to a given subject at a given time. Designating such total attainment by K_o, and the average attainment of each grade or age component by k_o, the total attainment of the community or of any component is given by the equation

$$K_{on} = k_{o1} + k_{o2} + k_{o3} \ldots + k_{on} \ldots \quad (1)$$

Obviously, in this equation, if $k_{o1} = 70$ and $k_{o2} = 70$, the fact that $\Sigma k_o = 140$ does not imply that the attainment of the second grade in the given subject is double that of the first. The values

given by K_{on} merely relate the attainment of a given grade or age component to other components of the same order. That is, K_{on} relates the attainment of an nth grade or age group to the attainment of other nth grade or age groups.

Educational progress, however, is not to be measured by a mere total attainment. The *rate* at which the attainment is achieved must also be taken into account. Now the rate of attainment is easily obtained by dividing the cumulated average score by the average number of years requisite to the achievement of the score. Denoting the average number of years elapsing during the interval of cumulation by t_o, the average age of the group of lowest rank at the time instruction in the given subject is begun by t_{oo}, and the average age of the group to which the cumulation extends by t_{on}, we have $t_o = t_{on} - t_{oo}$. Thus, if instruction in a given subject be begun in the third grade, the average age of the grade at the time being 8.2 years, and cumulation is extended to the fifth grade, where the average age is 10.4, we see that $t_o = 10.4 - 8.2 = 2.2$. The rate of attainment, V_o, is obtained from the relation

$$V_o = \frac{K_o}{t_o} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Thus, if $K_o = 300$ and $t_o = 5$, $V_o = 60$.

If we conceive of progress in educational qualification as something akin to the service which one secures from a transportation company, that is, as a function of total product and rate of production, we have at hand a true measure of its magnitude in the equation $P_o = K_o \frac{K_o}{t_o} = \frac{K_o^2}{t_o}$. Owing to the large values which K_o^2 may take relative to the values of t_o, the measure in this form is rather unwieldy. If, however, we divide P_o by 100, that is, let

$$P_o = \frac{K_o^2}{100 t_o} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3),$$

we shall find that the values of P_o assume manageable proportions. Thus, if $K_o = 300$ and $t_o = 5$, $P_o = 180$; and if $K_o = 600$ and $t_o = 4$, $P_o = 900$. Table I will serve further to illustrate

TABLE I. VARIATIONS IN THE VALUE OF THE PROGRESS INDEX

t	K				
	50	100	150	200	250
1	25	100	225	400	625
2	12.5	50	112.5	200	312.5
3	8.3	33.3	75	133.3	208.3
4	6.2	25	56.2	100	156.2
5	5	20	45	80	125

the variations in the value of the function P_a which accompanies certain variations in the values of t_a and K_a. Some of these values are evidently highly improbable. The diagonal from the upper left-hand to the lower right-hand corner of the table shows the variations in the value of P_a which result from the assumption of continuous average progress from year to year.

The function P_a I propose to designate the *progress index*. With measurements transverted into kentals, its computation is manifestly not arduous. It is desirable that a unit t be given the standard value of ten months, since the greater part of the work of large school systems is run on a ten months' basis. This enables one to take account of differences in the length of school years between various communities. Thus, $t = 1$ for a system with a school year of ten months, and $t = 0.9$ for a system with a school year of nine months.

A distinction between the progress index and the educational quotient is to be noted. The latter is a function merely of attainment and chronological age and does not take into account the duration of time consumed in the course of advancement. The level at which the water of a reservoir stands may be the result of a process of slow infiltration or it may be due to forced pumping, the rate of rise in the two cases being quite different. In this figure, the educational quotient would represent a measure of *level attained*, while the progress index would represent a measure of *capacity to attain a given level*. We may further

note that the educational quotient, when expressing the relation between average educational age and average chronological age, may continue constant from grade to grade or year to year. The progress index, on the other hand, grows with increasing educational ability. Thus a subject continued in the curriculum for four years will not show as high a progress index as one which is continued for six years, assuming, of course, that the rate of attainment is practically equivalent in the two cases. This property of the index is in keeping with our ordinary conception of progress of any sort.

While the progress index has been developed to meet a need of educational surveying, it may occasionally be useful in measuring, in a certain sense, the progress of an individual in passing through successive grades. If in equation (1) we substitute the kental scores attained by an individual for the average scores symbolized therein, we get $K = k_1 + k_2 \ldots + k_n$ as a measure of individual attainment for the n grades. Giving t its value from the number of years required to attain the score, the index is computed from the equation $P = \frac{K^2}{100t}$. In summing the kental scores for the n grades, credit is given only when promotion has been secured. The score for a grade skipped is estimated as the mean of the scores secured in the grades immediately preceding and following the grade passed over.

Education is a complex process made up of many elemental or component processes, such as, for example, the processes involved in the control of physical and brain growth, in the development of administrative and instructional efficiency, and in the fostering of the home and community attitudes which determine the objectives and financial support of the schools. Interest may center in the operation of one or the other of these elemental processes or it may center in the complex as a whole. We may, then, point out that the progress index is intended to serve in facilitating the summary evaluation of the net result of educational activity. It measures, we may say, the ability of the community to fashion from its raw child stuff a more or less finished product.

Editorials

RADICALISM AND CONSERVATISM

Thinkers have amused themselves from time immemorial by classifying their fellow mortals. We have classifications based on birth, wealth, temperament, intellectuality, and emotional equipment. There are romanticists and materialists, strict and loose constructionists, patricians and plebeians. There are those who dwell alone among the mountains and there are those who inhabit the cities of the plain.

And there are radicals and conservatives with all sorts of gradations from the extreme left to the equally extreme right. There are the eclectics, too, or as the out-and-outers will designate them, the trimmers. How conservative ought a person to be in education—and how radical? Must he be either the one or the other, or may he be a little of both? We have heard a desirable status in this respect described as follows: I do not wish to be so much of a radical that the past has no meaning to me nor so much of a conservative that my face is not turned toward the light.

We think the school man is much more likely to seek meanings in the past than he is to have his face toward the light. The institution of which he forms a part is the conservator of tradition. Indeed, its essential task has been declared to be the transmission of the heritage of the past. Under these circumstances it is more than likely that within our own circle those whom we think of as radicals may seem to the outsider to be rather tamely conservative.

Yet it is clear that the school must look to the future for the justification of its works. If it deals with the heritage of the past, it does so because the possession of this heritage on the part of children is believed to be their best guarantee of fullness

of life; and this life is largely in the future. Moreover, the schools are being called upon increasingly to carry the burden of reform and thus to take a hand in shaping the future of society. The followers of every creed and cult from patriotism and thrift to theosophy and anti-vivisection seek to capture the schools for the advancement of their doctrine. Indeed, through the agency of the schools the development of a national *Kultur* is being definitely attempted in most European countries, and the advocates of a similar undertaking in this country are by no means negligible. Whether or not this is desirable we make no attempt to declare. But even if we refrain from using the schools for the advancement of reform or the development of a *Kultur*, our decision not to do these things will still have reference to the future. In short, the school is by its very nature an institution which looks toward the future. No matter to what extent we may subscribe to the idea that the school in its course of study and its methods must meet the child on the level of his present world, we are never blind to the fact that what we are trying to do is to train him for adulthood.

The outlook of school people towards the future should be clear. Instead of seeking meanings in the past they should seek them in the future. The efficacy of a given procedure, not in the eighteenth or nineteenth, but in the twentieth century is their problem. Evidence for its solution must indeed be taken from the past; but the test of the evidence must be its application to the future.

Too often in the school business this is not realized. As an estate is sometimes held in *mortmain*, so is the dead hand of the past laid upon us and our estate. We do things which were once worth doing but the value of which has long ago been diminished. We teach ideas which were once vital and true, but which the march of events has made merely decorative. We concern ourselves with purposes which once had an important meaning but whose meaning has been diminished or lost. We do things, in short, because they were once done.

We do not realize the extent to which we are thwarted in the development of a rational modern school until we are confronted by the educational efforts of those who work outside of the usual educational circles. When we visit the schools in industrial and commercial establishments and find in them not as theories but as actualities such things as project teaching, socialized recitations, individual instruction, promotion by subjects, and curriculum building, we discover the extent to which our best endeavors are impeded by our own institutional connections.

We should undoubtedly provide as part of our public school enterprise a way in which such things may be tried out under sympathetic and favorable experimental conditions. If they prove to be superior to current practice, they should be adopted no matter what vested interest enters its protest. Research in this sense should form a part of the plans and the expenditures of every school system. Under an arrangement of this kind we may with safety be both conservative and radical. We may revere the past for its friendly lessons of guidance and caution, and at the same time we may with confidence turn our faces toward the light of a better day.

B. R. B.

MULTIPLE CORRELATION

The belief is general and more or less correct that in statistics multiple correlation is high-brow stuff. This is not because the idea is unusual. It is, on the contrary, very ordinary and decidedly practical. The reason multiple correlation is approached with awe is that in the development of its theory and formulae it must of necessity presuppose a knowledge of total correlation, partial correlation, and regressions.

But when one merely attempts to say what multiple correlation is and the use that can be made of it, one finds that here, as in so many other places in statistics, an appeal to common sense is all that is necessary. In the first place, the idea of the relationship of two things is familiar enough. Even the so-called man

in the street has it. He knows, for example, that the more wages people get the better clothes they wear, that dirt and disease go together, and that the ages of husbands and wives are likely to be similar. He knows there are exceptions, and if he ever stops to think about them they no doubt puzzle him. But he will maintain the essential relationship of such things and his round of living is based upon its existence. Likewise in school procedure the recognition of the relationship of one thing to another is fundamental. It is one of the bases of thought and action. For example, the ability to solve reasoning problems in arithmetic is readily admitted to be related to general intellectual ability and the procedure of a teacher is influenced by the presence of that fact.

In the second place, it is generally understood that relationships such as we have mentioned are not perfect. A higher wage may not in given instances be accompanied by the wearing of better clothes; a few young husbands may marry old wives; and the child of good intelligence may fail to get an expected number of right answers to a set of problems in arithmetic. Here we recognize—and the recognition involves nothing particularly abstruse—the existence of other influences. The children who fail to solve the arithmetic problems despite their good general intelligence may not be able to compute accurately. They may be "short" in what we call the fundamentals. Or they may lack in reading ability—either as to comprehension or as to speed. This lack of perfect relationship must arise from the fact that there are disturbing influences—other "things" which likewise have their relationships to the matter in hand.

The determination of the potency of each of these things when they are permitted to operate independently of one or more other things is the problem of partial correlation. The determination of the potency of these things when they operate together is the problem of multiple correlation. For example, if we wish to find out the effect of computing ability upon the ability to solve problems confining our attention entirely to pupils of the same general intelligence, our problem is one of partial correla-

tion. If, however, we wish to find out the effect upon problem solving ability of general intelligence and computing ability *combined* our problem is one of multiple correlation. It is the latter problem that we are now considering.

Evidently the *way in which we combine* general intelligence and computing ability is important. We can't merely add the two scores for each pupil. No such simple operation is possible. The relationship to problem solving of each of these abilities when each is taken independently of the other must afford the basis for working out the best combination. When that basis is used we obtain a regression equation in which problem solving is expressed in terms of general intelligence and computing ability. It is the score in problem solving when thus computed or estimated which is related to the actual score in problem solving. The expression of this relationship is the multiple correlation. In other words, the multiple correlation coefficient—conventionally represented by R—is the coefficient of correlation between a series of computed measures obtained through a regression equation and a series of actual measures of the same thing.

In working out a research problem recently, Professor R. L. Morton of Ohio University presented data which we are permitted to use in this connection. He had in hand five different scores for each pupil of a certain group. Among these were scores in (1) problem solving, (2) general intelligence, and (3) computing ability. He found many relationships among which the most important for our purpose is one which he wrote this way:

$$R_{1.23} = 0.54$$

He also wrote a certain regression equation as follows:

$$x_1 = 0.03\,x_2 + 0.02\,x_3$$

Now, $R_{1.23}$ is the symbol for the multiple correlation coefficient when variable number 1 is related to the best combination of variables 2 and 3—in this case when problem solving is related to the best combination of general intelligence and computing ability. This "best combination" arises when the re-

gression equation just given is used. Here x_1 means the computed score in problem solving, x_2 the obtained score in general intelligence, and x_3 the obtained score in computing ability. The equation expresses the fact that the best combination of a pupil's intelligence score and computing score, for the purpose of estimating his problem score, arises when the intelligence score is multiplied by 0.03 and added to the computing score multiplied by 0.02. $R_{1.23}$, then, expresses the relation between problem scores when so computed and the actual problem scores which may be obtained by giving a problem test.

It is not necessary to find the corresponding regression equation in order to compute the multiple correlation coefficient. We may, so to speak, go around the regression equation just as by a short-cut method we may obtain the ordinary correlation coefficient without finding the standard deviations. But every multiple correlation coefficient *has* its corresponding regression equation, either expressed or implied. In the second member of that equation are the same variables whose code numbers appear to the right of the point in the subscript of R. The first member of the equation is the variable whose code number appears at the left of the point in the subscript of R. Thus for $R_{1.23}$ we have a regression equation of the form $x_1 = ax_2 + bx_3$.

There are two formulae in vogue for computing the multiple correlation coefficient without direct reference to the regression equation. Both of them involve certain partial correlation coefficients. The one which seems to us easiest to remember is as follows (for three variables):

$$R_{1.23} = [1 - (1 - r^2_{12})\ (1 - r^2_{13.2})]^{\frac{1}{2}}$$

For four variables it is

$$R_{1.234} = [1 - (1 - r^2_{12})\ (1 - r^2_{13.2})\ (1 - r^2_{14.23})]^{\frac{1}{2}}$$

Professor Morton's fourth variable was reading comprehension, and $R_{1.234}$ turned out to be 0.57. Thus, despite the fact that reading comprehension is undoubtedly rather closely associated with ability to solve problems,[1] so much of its "contribution" to

[1] r_{14} was found to be 0.45.

that ability has already been contributed by general intelligence and computing ability that the addition of reading comprehension only raises the multiple coefficient three points—i.e., from 0.54 to 0.57.

The general formula (of the type we are using) for R is

$$R_{1.2345\ldots n} = [1 - (1 - r^2_{12})\ (1 - r^2_{13.2})\ (1 - r^2_{14.23})\ (1 - r^2_{15.234}) \ldots (1 - r^2_{1n.\ 234\ \ldots\ (n-1)})]^{\frac{1}{2}}$$

An inspection of the formula will show that since all coefficients, both partial and total, must by their nature be less than 1, each of the binomial expressions is positive and less than one. Accordingly, the entire second member of the equation is positive and less than one. R, therefore, is never less than zero nor greater than one. This however, is not a limitation upon its usefulness. It has the same meaning as the usual product-moment coefficient although the latter may take negative values. The fact is that the relation between the estimated and actual measures—the relation which R expresses—is of necessity *always direct*. If some or all of the total and partial correlation coefficients entering into the formula for R are negative the estimate still runs with the actual. It is as impossible to get a negative or inverse relationship as it is to extract the square root of a negative number.

R is zero when the terms of the regression equation are zero. In an equation of the form $x_1 = ax_2 + bx_3$, this can take place only when x_2 and x_3 are each wholly independent of x_1. An estimate of x_1 from x_2 and x_3 would then be no more valuable than a pure guess. It would be like estimating the weather from the ground hog's shadow or one's fortune from the turn of a card. Under these circumstances the value which R should take is zero and that is the value it does take.

We have said that the computation of multiple correlation does not necessarily involve the writing of the corresponding regression equation. This fact often saves a tedious process, for if we learn from the multiple correlation coefficient that the addition of a variable will not materially improve our estimate, the computation involved in writing the regression equation is use-

less. In Professor Morton's work he found that when he added a fifth variable (reading rate) he obtained $R_{1.2345} = 0.58$. This is only one point more than the value (0.57) already indicated for $R_{1.234}$. Accordingly, when intelligence, computing ability, and reading comprehension have already been used, the addition of reading rate is of little consequence. The writing of the regression equation for five variables will, therefore, scarcely improve the estimate of problem solving ability enough to make the computation worth while.

Multiple correlation, then, is an important practical concept in education. It serves to relate the best estimate or prophecy we can make from known data to the actual event we have estimated or prophesied. We believe that it will be used to a greater extent when its practical significance is better understood.

B. R. B.

Reviews and Abstracts

McCall, William A. *How to Experiment in Education.* New York, The Macmillan Company, 1923. 281 pp.

The purpose of this book is to job-analyze research in education. The research worker who, for lack of advanced training must do his work by rule of thumb, is told exactly what to do. The spirit of the book is connoted by these sentences: First do this, now do that, turn the crank this way, proceed now in this specific way, do this subtraction and read your answer. It is the result of your research.

The group of readers that this book desires to serve—and will serve with satisfaction—consists of teachers, principals, superintendents, and many professors of education who want to do research and who are able to find problems, but who lack the independent mastery of research tools and procedures required in setting up the mechanical organization of their studies. It will be agreed that McCall had a large audience in mind when he wrote the book.

This handbook for the experimenter first concerns itself with the selection and formulation of problems, the choosing of the sources of data, and the control of conditions. The discussion here is straightforward, concise, and adequate. (Chapters 1 to 5.)

The next section explains in detail the construction of certain experimental measures. The emphasis is placed on the construction of the standard test. Methods of determining the validity, reliability, and score values of tests as wholes and of test items are described and illustrated. The building of T-scales, B-scales and C-scales is stressed.

The third section of the book sets up in detail three fundamental *molds* into which an experimenter may run his data in order to have them come out at the other end of the mold properly transformed into findings. McCall does not stop with telling what the main procedures of molds in research are, but he lays out the actual procedures step by step. That is, he makes a genuine job analysis of research. A worker can take the outlines, insert his own data, and by following the directions execute his study without using any more judgment than that possessed by a fairly good clerk.

The last section of the book states the principles underlying causal investigations and gives in detail the directions and formulae to be used. This is, of course the correlation technique. The tables to use in computing partials are a welcome contribution, as are also the molds for partial regressions.

The book is based upon the assumption that valuable research can be done by workers who must be told what to do in an exceedingly rule-of-thumb fashion. Whether workers who need this type of direction *can* do research or properly interpret results remains to be seen. At all events, the author did

exactly what he said in his preface he intended doing. He assembled a methodology of research. It is nearly fool proof.

The intricate symbolism, certain series of formulae, maze-like in complexity, will discourage some workers—quite properly. The organization of his expository passages is at times confusing. Thus, a formula on page 140 is followed by a partial explanation of it. Instructions then follow for performing certain statistical work; and the completion of the original explanation is found some ten pages away. Some workers will question the choice of certain methods when an alternate one may appear to be better. Perhaps the book does not point out with enough emphasis the shortcomings and pitfalls in research. Thus in reporting Reavis' study the readers may be led to think that because the procedure was correct the findings must be beyond criticism. McCall lets the reader think that an adequate measure of teaching ability was used. None was, because none yet exists. In discussing the use of the questionnaire, it is not apparent why the discussion did not contain advice on how to study the reliability of the results. It is also a little disappointing that the procedures could not have been illustrated by a better selection of researches. It is not clear why the author treated techniques of ratings so curtly. He might have successfully played the prophet by pointing out that, while most good research of late has been in constructing tests, we are entering a period when research in better teaching materials and better teaching techniques will be to the forefront. He could thus have staked out areas of research for his readers.

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HOLT, W. STULL. *The Federal Board for Vocational Education: Its History, Activities and Organization.* New York, D. Appleton and Company, 1922. 74 pp. (Service Monographs of the United States Government, No. 6)

This report gives in condensed but in an exceptionally clear manner the history and development of the legislation and subsidization of vocational education in the United States.

For the administrator who is not wholly familiar with the growth and development of the vocational education movement the monograph will provide adequate information, so collected and organized as to save much time. For the one whose information is sketchy, if I may use that term, the clear cut statement of the beginning and subsequent development of the movement will serve to clarify and unify his conception of it.

The administrators who must cooperate in the use of Smith-Hughes funds will find this bulletin of great service. Through it he may become familiar with the provisions of the Act, and at the same time learn of the various limitations under which he must work. Because of this fact alone the monograph is of great value. Again, it has value for many who are not administratively interested. Through its condensed statements the casual reader may secure a better understanding of the efforts of the government to make educational opportunities as broad as possible. Especially is this true in connection with the civilian rehabilitation work.

From the table of publications one may well collect the titles of pamphlets giving explicit and definite information along various lines of the Federal Board's activities. For the general reader these pamphlets offer an opportunity for greatly broadening his general industrial information. The bibliography contains an excellent list of articles, some of them in criticism of the activities of the Board, others offering suggestions for accomplishment, and still others presenting in a more philosophical spirit the importance of the movement as a whole.

The monograph deserves a place in the library of all those who are interested in industrial work, whether from the viewpoint of the administrator or the teacher, the employer or the worker.

ELDON L. USRY

Ohio State University

FLEXNER, ABRAHAM. *A Modern College and a Modern School.* Garden City, New York, Doubleday, Page and Company, 1923. 142 pp.

The latter half of this book is a reprint of the stimulating essay published some eight years ago as an occasional paper by the General Education Board, under the title "The Modern School." It is gratifying to have it in this more permanent form. No review of it is called for, because it has had such wide study and has been the subject of such general and favorable comment.

The first half of the book applies the philosophy made so familiar in "The Modern School" to the American college. It challenges the present organization of college curricula and college methods of teaching. The author holds that the purpose of the college is largely defeated by two conditions, namely: the aimlessness which characterizes the student's choice of studies and the absence of a satisfactory motive for the student's study.

The essay is devoted mainly to a defense of constructive suggestions proposed for the correction of the above faults. It is evident that, in presenting these suggestions, the author is in rebellion against the formalism and machinery prevalent in colleges. He feels that the colleges are organized to serve only a small percent of those now in attendance. These he calls the "devotees to learning as such." Two other classes are those who are ultimately to follow (1) a profession or (2) a business or industrial career. This classification is seen to be vocational, the author claiming that earlier decision as to life's work on the part of students should be insisted upon.

The chief reform advocated for the "Modern College" is the organization of curricula around vocational purposes. Thus will the question be settled as to the elective system. Thus also will be provided a motive for work. The pre-medical curriculum is cited as a good illustration of an organization through which more culture is obtained and more purposeful study engaged in than is true of the aimless elective courses taken under the general group requirement.

Thus the vocational motive is the basis of his appeal even though he says "But I am urging, not that practical training displace academic training—

the college is distinctly not meant for that—but rather that academic training be so organized as to realize the intellectual and cultural values of the practical or professional discipline or activity which will come next."

To use the vocational motive, and yet not to vocationalize the instruction—that's the problem, and Mr. Flexner does not entirely solve it. His assumption that college students pursue with zeal a preprofessional curriculum is only true in part. Among the courses commonly required by medical schools for admission is physics. Inquiry does not reveal any strong purpose operating to secure zealous work in physics by pre-medical students. Pre-medical students work zealously in comparative anatomy, but not in French. In short, a pre-medical course is motivated from above in the proportion that it is understood by the students to have a definite bearing upon their medical careers, or in the proportion that it is to them vocational. So the dilemma still remains. To make sure that a good doctor is first a good citizen is the function of the general training of the college, and Mr. Flexner's plea for using the vocational motive in the college is not altogether convincing.

In spite of this, however, the essay is most stimulating, and colleges in general will profit greatly from its general point of view.

F. J. KELLY

University of Minnesota

MIRICK, GEORGE A. *Progressive Education.* Boston, Houghton Mifflin Company, 1923. 314 pp.

The student of contemporary education who makes an earnest effort to keep up with the avalanche of new books which the publishers are continually announcing, soon comes to divide them into two classes: those which merely repeat what has already been said many times, and those which, at least in a measure, appear to be new and creative. This book belongs to the second of these groups.

It is divided into two parts, one of seven chapters dealing with "the reasons for," and a second of seven chapters, outlining "the methods of," progressive education. The "reasons" are, in fact, underlying principles, application of which constitutes the method.

"Progressive education" appears to be just enlightened modern educational practice, and one is tempted to inquire why the words should be employed as if they designated something special, almost a cult. "Progressive education," says the author in his Preface, "differs from all other kinds in this, that it is patterned after nature." If it is the same recognition of the nature of children and of society and of human development toward which we have been endeavoring to adjust our professional thinking and doing ever since Rousseau, it hardly seems necessary to hail it by a new and almost mystic designation.

Essentially, this is a volume on educational method and procedure. While the pattern is, as has been indicated, new and not uninteresting, the content is in the last analysis, just current good practice. The chapters of Part II deal with Discipline, Individual and Socialized Study, the Problem and the Project,

Self-Education and Appreciation, Educational Measurements. The author describes well and argues for all the theories which we have in recent years come to associate with John Dewey, but most of which really are derived from Jean Jacque Rousseau.

As an exposition of these principles the book is an excellent piece of work. It is thoroughly well reasoned, and decidedly worth reading. For the student preparing to enter the profession it should be informing and inspiring. Over-zealousness, however, sometimes leads the author to make curious assertions. Let one example suffice: "*Philosophical thinking starts with a conviction, a mind 'made up,' and it proceeds to find reasons for supporting and defending the 'conviction'*" (p. 12). One gasps and wonders whether he is expected to take this seriously. The statement certainly is not true. The syllogism, the classic form of philosophic thinking, proceeds from premises to a conclusion by an impersonal, objective process. The fact of the matter is that there are two types of formal thinking toward a conclusion on the basis of evidence, inductive and deductive. To designate one of these as scientific and to dub the other in a way that implies contumely, is arbitrary to say the least.

The book on the whole is, however, decidedly worth a most careful reading. It is stimulating, exceptionally well organized, well reasoned, and by means of summaries, recapitulations, and diagrams the material is well "taught."

JOHN L. HORN

Mills College

SKAGGS, ERNEST BURTON. *An Elementary Textbook of Mental Measurements.* Ann Arbor, Michigan, George Wahr, 1923. 169 pp.

This book aims to give a general survey of the field of mental measurement in a very brief compass. It is more of a compendium than a systematic text. The mere listing and description of the various tests and testing movements requires considerable space, so that comment and discussion, if they are to be kept within the narrow limits imposed, must perhaps necessarily be somewhat dogmatic and disparate and without the supporting evidence which would often seem desirable. In an elementary course of university grade, the book would need much supplementing from other texts, and this is, indeed, the author's intention.

Examples are given of group and individual intelligence tests classified as "language involving" and "non-language." The Herring Revision of the Binet-Simon Tests is not mentioned and Kuhlmann's important contribution is dismissed with the statement that "Kuhlmann also made a revision," (referring probably to Kuhlmann's earlier revision and not to his 1922 revision). Several of the more recent group tests and the revised forms of earlier tests are not listed. Brief statements are made in regard to tests of the "simple cognitive processes," "higher central processes," and "emotional and feeling processes," and in regard to "measurement of talent," "measurement of character," "vocational selection," and "educational achievement."

Four pages are devoted to the "application of mental measurements," and thirteen to "minimum statistical essentials involved in mental measure-

ments." Similarly brief chapters are devoted to the nature of general intelligence and the possibility of its measurement, "heredity and training," comparison of the principles of the "point" scale and the Binet scale, and to "mental tests as instruments for individual diagnosis and prognosis." Some of the performance tests and standards for the same are listed in a supplementary chapter. A list of group tests, the directions for the Kent-Rosanoff Association Test, and "certain more technical details in the constructing and using of mental measuring scales" are given in appendices.

WALTER F. DEARBORN

Harvard University

WALLIN, J. E. W. *The Measurement of Mental Traits in Normal and Epileptic School Children.* Oxford, Ohio, Miami University, 1923. 174 pp. (Miami University Bulletin. Series 21, No. 8. April, 1923)

This study, the experimental work for which was carried out several years ago during Dr. Wallin's connection with the New Jersey State Village for Epileptic at Skillman, undertakes to compare normal and epileptic school children both quantitatively and qualitatively, through the application of a group of tests classified as follows: (1) memorizing visually presented numbers; (2) rapidity of thinking; (3) addition; (4) controlled association; (5) attention and perception; (6) observation; (7) memory of logical and illogical associations; (8) visual imagination; (9) word construction; (10) sentence construction; (11) recognition; (12) speed of motor reaction.

According to intelligence tests (Wallin's 1908 guide) the median mental age of the epileptic group was 10.4 years, a median retardation of 4.8 years from chronological age; while the normal group, assumed to be of approximately average intelligence, averaged 1.9 years higher. It was estimated, with Dr. Wallin's usual conservatism, that 63.3 percent of the epileptic group were feeble-minded.

The normal children were found to be consistently superior to the epileptics, even in the simple sensory tests; the latter finding being somewhat out of accord with the findings of Binet and Simon, who concluded that "in all grades of defectiveness, the fineness of perception equals, or nearly equals, that of the normal individual. The author expresses the opinion that, although "the inferiority of the epileptics is clearly apparent," the relative deficiency may have been somewhat exaggerated in this experiment because of the use of group tests. On the other hand he believes these findings to be a more valid measure of the intelligence of the epileptic group than could have been obtained with his 1908 revision of the Binet-Simon scale.

The results of the comparison, expressed in terms of "average efficiency," by tests, are as follows:

	Normals	Epileptics
Immediate memory	41.6	25.9
Rote memory	10.0	2.5
Spontaneous association	45.1	15.0
Addition	19.5	7.5
Antonyms	39.1	5.9
Perception	36.3	23.3

Observation (immediate)	45.8	30.9
Observation (remote)	23.4	9.7
Paired associates (immediate)	68.1	25.5
Paired associates (remote)	22.1	7.6
Imagination	4.7	2.4
Word construction	9.1	2.7
Sentence construction	3.8	0.7
Recognition	59.7	19.6
Motor speed	97.1	77.6

Although the author has conducted his experiments with great care, the value of the study as a comparison of the mental efficiency of epileptic and normal children is considerably impaired by the selective nature of the cases. It is, however, perhaps the most intensive effort yet made in this direction.

J. HAROLD WILLIAMS

Los Angeles Diagnostic Clinic

CUBBERLEY, ELLWOOD P. *The Principal and His School.* Boston, Houghton Mifflin Company, 1923. 571 pp.

To review *The Principal and His School* one must needs amend the title. The varied and intricate problems peculiar to high-school administration are entirely ignored. From beginning to end the 571 pages are devoted to a carefully detailed analysis of the work of the *elementary-school* principal.

The problems treated are grouped under four headings: organization, administration, supervision, and school extension. Each of the 28 chapters is followed by an annotated bibliography and a set of questions and problems. The latter should prove helpful to the student preparing for his first principalship; and the former to principals, prospective and experienced, who desire to make extended studies of specific problems confronting the school principal.

Though rich in content and carefully complete in detail this latest volume from the dean of American writers on school administration lacks in two important respects. First, much of the content borders on the field of generalities, splendidly true but meaningful only as the reader's experience directs his interpretation. Like Polonius' advice to Laertes it seems "but the well-seasoned fruits of general experience and reflection." Second, the author is inclined to accept the elementary-school principalship too much as it now is and too little as it might readily be made. While he evidently sees the new type of principal—courageous, daring, professionally minded, leader of teachers and community, trusted advisor to the superintendent—yet he fails utterly to fire the reader's imagination with his vision. The men and women who are really making the elementary-school principalship a position of educational leadership are not satisfied to be *merely* efficient workmen executing orders from the central office without understanding the philosophy behind the order.

Yet, withal, *The Principal and His School* meets a decided need: it fills a gap that has been too long neglected in the field of school administration. In it, the principal with years of experience to his credit will find much help, many suggestions, and sound advice. To the beginning principal and to the student looking toward his first principalship, this volume will prove invaluable.

It represents a breadth of experience and wisdom of judgment much needed in the present stage of development of the elementary-school principal's job.

Ohio State University J. CAYCE MORRISON

FINNEY, ROSS L. *Elementary Sociology: a Constructive Textbook for High Schools and Junior Colleges.* Chicago, Benjamin H. Sanborn and Company, 1923. 234 pp.

This book makes a distinct advance in the treatment of sociology for pupils of high-school and junior-college age. The author set before himself certain definite objectives and directed his writing through every page to the realization of these objectives. There is a freshness, a poignancy, and a warmth of personality about the treatment which are unique in books of this kind. A distinctly ethical strain runs all the way through. This ethical purpose is very effectively worked out through his discussion of democracy, the family, industry, and religion. The material is not organized under the usual "problems"—divorce, poverty, etc.—and thus escapes the morbidness that is likely to grow out of finding the world out of joint. Instead of this, a spirit of optimism and constructiveness prevails.

It is possible that this ethical purpose has been overdone, that certain complexities in the social process have been too completely ignored for the sake of making a point impressively, and that pupils may in consequence emerge from the course with a false idea of the simplicity of the science of society and of the remedies needed for present maladjustments. But whether one regards this strong ethical strain as a merit or a defect will depend upon his conception of the function of sociology at the high-school and junior-college level. Personally the reviewer prefers such a book to one that merely sets forth a mass of information about the structure, activities, and problems of society. Whatever corrections are needed to make pupils realize how complex some of these problems are, can be supplied by the teacher, who will at least have pupils to instruct from whom fire has been struck by the reading. It must not, however, be understood that the book is mere propaganda; the author shows sound scholarship in sociology and in the related fields of economics, biology, psychology, and political science.

Moreover, he has employed rare tact and pedagogical skill in the construction of the book. His treatment of evolution and of questions that might wound the feelings of certain sects or races are examples in point. In this, however, there is no sacrifice of scholarship or of effectiveness. Other evidences of pedagogical insight and practical consideration of the needs and limitations of high school, are: the concentration of references to supplementary reading on small enough number of books that the average high school could afford duplicate copies of them for the library; a concreteness of approach which high-school students could follow yet culmination of the discussions in a substantial science of sociology; and a remarkably stimulating and valuable set of exercises at the close of each chapter.

It is the opinion of both the reviewer and of Doctor C. W. Coulter, who read the book through, that Doctor Finney's book is far and away the best text available in elementary sociology for pupils of the age level for which it was intended.

CHARLES C. PETERS

Ohio Wesleyan University

News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

Bulletin No. 1, 1923, of the Chicago Principals' Club is devoted to a report on supervision. Persistent errors of speech, first-grade phonics, the interpretation of results of standardized tests, the use of semester failure reports, and a selected bibliography on supervision are the most important topics in the bulletin.

The Nashville (Tennessee) Board of Education has recently adopted the recommendation of a sub-committee that the schools be organized on an all-year basis. This means four 12-weeks periods each year. The action was taken in order to use the school plant to greater advantage and also to accommodate the children who wish to go through school more quickly than is now possible.

On December 3 forty California high schools participated in a radio spelling contest. The words were broadcasted from the State Superintendent's office and more than three thousand seniors in these schools took the test. The participating schools are enthusiastic and have requested the department to conduct a series of contests by radio. Arrangements are now under way for the next contest, which will be in mental arithmetic.

A recent bulletin of the Attendance Department of Warren (Ohio) shows the percent of perfect attendance for the first six-week period of the current school year. The figures show the highest percent of attendance attained by every room in all the buildings of the city, and a corresponding report for perfect attendance. While the percent of attendance of the highest rooms ranged from 96.4 to 98.8, the percent of perfect attendance ranged from 38.8 to 82.5. Evidently most of the absences were of very short duration.

Because of the lack of housing facilities while a new school building was being constructed, Superintendent E. A. Lewis of Bath, New York, arranged for high-school pupils to study at home and to attend school only for recita-

tion. The attendance for the month of September was 97 percent, and punctuality, 98 percent, which showed fine cooperation on the part of the pupils. The plan is regarded as so successful that with the completion of the new building it is expected to grant the Seniors the privilege of studying at home and attending recitations only.

The Division of Elementary Schools of the Alabama State Department of Education sends out a monthly general bulletin to the county-school supervisors. These bulletins present news items from various counties and general suggestions for supervisory work in different subjects. The October bulletin devoted the greater part of its space to the procedure for one type of word and phrase drill. The article gave concrete directions which county supervisors or individual teachers could follow without difficulty. The November number contained some definite suggestions for teaching local geography and primary reading.

The Los Angeles research department which has been issuing the *High-School Research Bulletin* for the past two years has begun Volume III under a new name, *Educational Research Bulletin*. The cause of the change is due to the increased scope which the bulletin is intended to cover. This issue also calls attention to the formation of a high-school research cabinet, consisting of the director of high-school research, members of his staff, and teachers in charge of research in the several high schools. It is expected through this cabinet to increase the effectiveness of the research work and disseminate it to the contributing schools more readily than heretofore.

"The Division of Research of the National Education Association and the 1924 Yearbook Committee of the Department of Superintendence will have a joint exhibit at the winter meeting, located in rooms E-22 and 24, Congress Hotel, Chicago, Illinois. This exhibit is being planned so that it will be of practical value to school administrators in indicating types of educational research now in progress throughout the country. It will include representative studies by research bureaus, courses of study, reports of superintendents of schools, weekly and other bulletins issued by superintendents, supervisors, and others. A large number of educational research bureaus are cooperating."

Under the direction of Miss Florence M. Smith, supervisor of writing, East Orange, New Jersey, a handwriting scale of somewhat unusual type has been devised. The scale consists of three samples of varying quality under each of fourteen heads. These are: Page Effect, Neatness, Evenness, Spacing, Size, Spacing of Letters, Spacing of Words, Alignment, Keeping of Form, Letters not Closed, Parts Omitted, Parts Added, Smoothness, and Spacing of Lines. Each of these items is evaluated so that the sum of the highest value on each part of the test gives a perfect score of one hundred. Such a device should be very helpful to teachers and supervisors in diagnosing writing defects and working for increased quality.

Superintendent C. B. Smith of Pekin, Illinois, is developing a pupil report card in which there are but three grade groups: AA, above average; A, average; and BA, below average. In order to use such a scheme it is necessary that teachers appreciate the advisability of dispensing with figures in grading pupils. To assist them in seeing that such figures are quite largely affected by the line of thought of individual teachers, an experiment was conducted in which one paper in junior high-school geography was mimeographed and graded by each of the 65 teachers in the schools. The highest grade for the paper was 95 percent, and the lowest was 59 percent. The individual scores on each item of the test were also distributed and showed a range of 35 to 100.

Principal H. C. Wegner of the McKinley Senior High School, Marshfield, Wisconsin, has recently sent us a copy of his graphic progress report card. The card provides space for five subjects which are to be written in along the margin. The ratings given are Excellent, Good, Fair, Danger, and Failure. The striking thing about the card is that the danger zone (value between 75 and 79) is printed in motled red and the failure region in deeper red. Horizontal rows are provided for each of the five ratings of each subject, and vertical columns for the rating periods. The class average at each period is graphed in red ink, and the child's standing in black. Thus, the child and parent may see at a glance the child's standing with respect to that of the class and with respect to the danger and failure zones.

Mr. Ray Latham, assistant superintendent in charge of research in the Duluth public schools, reports the following finance data from thirty-eight representative cities, ranging in population from 50,000 to 100,000. The figures give the average cost per pupil in average daily attendance and the percent of the total cost:

	Total	Administration	Special Supervision	Teaching	Textbooks	Supplies	Miscellaneous
Average for 38 Cities . .	$64.95	4.25	1.45	55.77	1.02	1.87	.59
Percent of Total.	100.00	6.50	2.20	85.90	1.60	2.90	.90
Duluth.	$71.82	5.09	2.25	61.66	.71	2.06	.05
Percent of Total.	100.00	7.10	3.10	85.90	1.00	2.80	.10

In a report submitted to the New York State Board of Examiners by District Superintendent John L. Tildsley, of New York City, the suggestion is made that additional credit be given to a high-school student who takes four consecutive years of a single subject. This applies particularly to foreign languages, mathematics, and science. With reference to foreign languages, the report calls attention, first, to the fact that only one-third of the students who take two years of a language continue through the third and fourth years; and, second, to the fact that the fourth year is decidedly more valuable than

any other. It is recommended that an additional half unit be given to those who complete the fourth year of a subject, provided the student's rating is not less than 75 percent. Superintendent Tildsley believes that college entrance boards can be induced to agree with this plan. We believe it has decided merit.

Some of the finest school publicity in newspapers that we have ever seen has appeared in Grand Junction, Colorado. Immediately before the opening of school regular advertisements were presented featuring the opening of school and the advantages of education. The Rotary Club, banks, and other business houses donated space in which education was the prominent feature. The cuts were in striking contrast to the cartoonist's idea of school as distasteful to the children, instead they show—what is true in a vast majority of cases—children going happily toward the school building. In addition to these features, which were doubtless prepared by someone thoroughly familiar with commercial ad-writing, the people are shown a weekly school section that is prepared by the superintendent. It is evident that the schools are presenting their case regularly to the pupils that come in. This is what the schools of every community ought to be doing.

The *Charleston Gazette* (West Virginia) announced some time ago the result of votes from 130 famous men and women throughout the country on the following question: "What are the ten most interesting books?" The twelve living authors in order of votes were as follows: Kipling, Wells, Conrad, French, Shaw, Hardy, Doyle, Romaine Roll and Van Loon (tied), Cabell, Hansen, and Tarkington (tied). The ten leading American authors in order of their votes were Mark Twain, Emerson, Poe, Walt Whitman, Van Loon, James B. Cabell, Herman Melville, Tarkington, R. H. Dana, Jr., and Bret Harte. An analysis of the votes on the list furnished shows the plays of Shakespeare taking first place; the Bible, second; *Huckelberry Finn*, third; *Treasure Island*, fourth; *Les Miserables*, fifth; *The Three Musketeers*, sixth; *David Copperfield*, seventh; *Vanity Fair*, eighth; *Alice in Wonderland*, ninth; and *Iliad* and *Odyssey*, tenth.

Principal H. V. Church of the Morton High School, Cicero, Illinois, safeguards his students by arranging each semester an examination schedule covering each day of the semester. He has ten periods in his school day and the first ten days of the semester are assigned in consecutive order to these ten periods. The second ten days, the third, and so on are likewise assigned. In this way classes reciting the first period in the day may have an examination on the first, eleventh, twenty-first, etc. days of the semester and on no others. Second period classes may have examinations on the second, twelfth, twenty-second, etc. In this way no child is compelled to take two examinations on the same day. The plan has been in operation for six years or more and it works well. No final examinations are given at the end of the term, and recitations are held until the last minute of the last day. Examination grades

are kept separate, are not reckoned in the monthly grades, and the average of the examination grades during the term are used for a term examination grade in the subject.

Ohio State University announces the Fourth Educational Conference for April 3, 4, and 5. The keynote will be "Standards in Education." Among the speakers will be:

Dr. William McAndrews, superintendent of schools, Chicago.
Dr. W. W. Charters, University of Pittsburgh.
Dr. E. C. Hartwell, superintendent of schools, Buffalo, N. Y.
Dr. T. C. Mendenhall, Trustee, O. S. U., Ravenna, Ohio.
Dr. T. E. Finegan, former state superintendent of schools, Pennsylvania.
Dr. B. R. Buckingham, Ohio State University.
Dr. Ernest Horn, University of Iowa.
Dr. C. S. Berry, University of Michigan.
Dr. E. R. Johnstone, director of Vineland, N. J., Training School.
Dr. H. A. Cotton, director of Trenton State Hospital, N. J.
Dr. R. M. Tryom, University of Chicago.
Dr. V. T. Thayer, Ethical Culture High School, New York City.
Dr. E. T. Sage, University of Pittsburgh.

We have just received a copy of the Strayer-Engelhardt score card and checking list for the records and reports of school systems in cities of 100,000 people or less. The authors have divided the necessary records and reports into the following groups: (1) records and reports involved in the general operation of a school system, which include records of the board, reports of the superintendent's office, financial records of the board, the school census, and data regarding enforcement of compulsory attendance; (2) records and reports involved in instructional service, which include records and reports of elementary principals, secondary principals, supervisors, elementary teachers, secondary teachers, textbook records, and records of instructional supplies; (3) records of operation of plant; (4) records of maintenance of plant; (5) records of fixed changes; (6) records and reports involved in debt service; (7) records of capital outlay; and (8) records of auxiliary agencies such as library service, health service, etc.

The form provides for a total score of one thousand points with weighted values for each of the sub-items under the heads already given. The card is published by the Bureau of Publications, Teachers College, Columbia University.

Education Bulletin Number 12, September, 1923 issued by the National Catholic Welfare Council gives the results of a survey of the Duluth Catholic Schools by Sister M. Katherine. The battery of tests consisted of the National Intelligence, Thorndike-McCall Reading, Buckingham Arithmetic Problem, Woody-McCall Mixed Fundamentals, and Buckingham Extension of the Ayres

Spelling. Tests were given to more than 2,000 children in grades three to eight, inclusive, in 11 schools in the Duluth diocese. The results show (1) that there are a large number of children of superior intelligence who apparently are not being as well cared for as they should be; (2) that the amount of retardation is about average when compared with that found in the public schools of the country, but that the number of accelerates is low; (3) that achievement in the fundamentals of arithmetic is very creditable, and that in problems the results run parallel to grade norms but at a lower level; (4) that the results in reading are somewhat lower than the grade norms in the upper grades; (5) that spelling achievement in all schools is high.

The bulletin shows evidence of careful work by one well trained to analyze results and give suggestions which are usable by teachers and principals.

At the Andrews School, Pittsburgh, Pennsylvania, under the direction of Miss Etta A. Dunn, some interesting experiments in project teaching were completed last year. We were particularly interested in two of the outlines of these projects which Miss Dunn kindly communicated. One of them had to do with the proposed canal from Lake Erie to the Ohio River. The other was a study of Whittier's *Snow Bound*. The latter culminated in a public meeting in which the patrons of the school were invited to witness the completion of the project. The plans for these two projects make it evident that they must have been of high educational value.

Miss Dunn also submitted with this material some comparative data in which the records of two VI-A classes, one taught by the project method, and the other taught traditionally, are presented. Among other things, the semester averages, the reading quotients, the intelligence quotients, and the chronological ages are reported. The advantage seems to be rather decidedly with the class taught by the project method. Although it is evident that some of the items in the report are largely independent of any method, we are entirely prepared to believe that the class taught according to the plans submitted would be likely to be benefited to a greater degree than is usually the case under the ordinary classroom procedure.

State Superintendent M. M. Parks of Georgia presents us with a teachers' decalogue:

1. To teach and practice the simple rules of public and personal health.
2. To teach sincerity, honesty, generosity, and loyalty—that is, the hygiene of character.
3. To inspire pleasure in work and respect for honest toil.
4. To teach habits of thrift, temperance, and self-mastery.
5. To furnish practical training that will produce a living wage.
6. To teach how to write well, speak well, and listen well.
7. To inspire a love for books, and to teach habits of study through the tools of knowledge.
8. To teach the appreciation of music and art as revealed in the fine arts, in literature, and in history.

9. To teach nature and nature's laws from electricity to germs. To emphasize the inductive or scientific method of thinking which places facts before opinions.
10. To teach a proper appreciation of, and affection for Our Country as a nation, its history, its institutions, and its Constitution. To teach respect for the laws of God and man, and to uphold the best ideals of Americanism.

All of our readers will subscribe to this decalogue, but a great many of us would like far more specific direction than we have yet found as to the method by which it can be translated into character education.

Superintendent Charles S. Meek of Toledo tells a story which illustrates the extent to which a testing program together with a system of records may be utilized to solve difficult administrative problems.

Superintendent Meek was approached by certain philanthropic agencies who requested that he forbid boys under fourteen to sell newspapers. A harrowing picture was drawn of the retarded boys, backward in their work and deprived of their rightful chance in life. On the other hand, the newspapers learning of the proposal opposed it vigorously. Ordinarily under such circumstances the Superintendent would reach a decision which would satisfy but one side. He had, however, in his files the results of city-wide testing in the Stone Narrative Reading Scale, the Woody Arithmetic Scale, and the Buckingham Problem Test. He collected the scores of over thirteen hundred boys of the age of the newsboys and found that 58 percent of those who were selling papers equalled or surpassed the median of their respective grades on the Stone Narrative Reading Scale, that 62 percent equalled or exceeded their grade median on the Woody Scale, and that 72 percent were at or above the median on the Buckingham Problem Test. It appears conclusive that, whatever argument might be made for denying these boys the right to sell newspapers, it does not rest on the fact that they were failing in their work or were being denied an opportunity to profit by the offerings of the school. Superintendent Meek remarked that it is mighty handy to have the results of those tests on file.

Montgomery County (Alabama) is justly proud of this record in transportation of school children:

The first truck went into operation in the fall of 1918, and 34 trucks are now in daily operation. During this time we have not had a single accident or near accident at a railroad crossing; and but one accident of any kind, which was not serious, and was due to a defective steering gear.

They attribute this record to three causes: (1) a careful selection of drivers with a resultant body of responsible men; (2) an iron-clad rule which provides that a truck carrying school children must not pass a railroad crossing until it has been properly flagged, and must not run over 17 miles per hour; (3) school mechanics have oversight of the trucks and are required to file daily reports showing the work done on each truck. Violation of number two results in immediate dismissal of driver.

The principal of each school appoints a child captain for the truck. The captain's duty is to assist the driver in keeping order, see that all children are in the truck, flag railroad crossings, and perform such other duties as directed by the principal. The railroad is properly flagged for the passing of a school truck when the truck comes to a complete stop at least ten feet from the track and the captain gets out and stands on the crossing until the truck has passed over.

It would seem that the safety of our children is of sufficient importance to make such conditions uniform in all districts where transportation is provided.

Bulletin No. 1, November 1923, University of Wisconsin, Bureau of Educational Research, is a mimeographed bulletin by Doctor Frank L. Clapp on "The Number Combinations: Their Relative Difficulty and the Frequency of Their Appearance in Textbooks." The report is based on results from about seven thousand pupils in four school systems when the number combinations were presented alone, and from about 4,500 pupils in forty-five school systems when the combinations were presented in problems. Among the results which ought to be of significance to teachers are the following:

(1) Combinations tend to hold the same general positions of relative difficulty throughout the grades.
(2) Zero combinations are much more difficult when presented alone than in problems.
(3) In general, the larger the members of a combination the greater its difficulty.
(4) Pupils have reduced the combinations most nearly to an automatic level in addition, with multiplication, subtraction, and division following in the order given.
(5) In actual problems the smallest percentage of error in combinations occurs in multiplication, with subtraction, addition, and division in the order indicated.
(6) Members of "pairs" of combinations are no more nearly equal in difficulty than are other combinations.
(7) The correlation between the difficulty of combinations and the frequency of their appearance in the two textbooks which were analyzed was negative for all the operations and for both books. The coefficient ranged from negative .277 to negative .538.

The recent publication issued by the Lincoln School of Teachers College and entitled, *Lincoln Verse, Story,* and *Essay,* suggests interesting possibilities. Of course, we all know that the Lincoln School is advantageously situated to do certain things. But what other school is not? The fact that this school is doing some of the things which it was organized to do shows that it is being operated with a keen eye to its objectives.

The contents of this volume have appeared in *Lincoln Lore,* the literary magazine of the school. The pieces, both verse and prose, which appear in this volume were written by pupils in the school. Many of them even when judged by standards of maturity are finely done. But what we are most

interested in is the motivation which the high standard of the school magazine affords. Writers on the teaching of English have sometimes proclaimed the doctrine that theme writing should be judged on the basis of authorship rather than of studentship. To many of us this has seemed an impossible standard to apply. To attempt to elevate the product of the high-school classroom to the level of publishable material has seemed to us a counsel of perfection. The Lincoln School, however, exemplifying in a striking way its experimental approach to educational questions, has evidently made the attempt and this volume is a report of its success.

We are led to conjecture to what extent this and similar materials, written as they are by students in the secondary schools, may afford a stimulating curriculum material. It is entirely possible that in the teaching of English composition a much more effective use may be made of a textbook composed of student writings than of a book composed of literary masterpieces written by adults. In the former case the objective is clearly attainable for the simple reason that it has already been attained by pupils of the same grade as those who are under instruction. In the latter case the objective is remote and no doubt loses much of its stimulating quality because of a feeling on the part of students that it is unattainable.

What is the aim of education?

The Student says Books.
The Scholar says Knowledge.
The Preacher says Character.
The Minister says Service.
The Philosopher says Truth.
The Artist says Beauty.
The Epicurean says Happiness.
The Stoic says Self-Control.
The Christian says Self-Denial.
The Democrat says Self-Government.
The Statesman says Cooperation.
The Ruler says Loyalty.
The Patriot says Patriotism.
The Sage says Wisdom.
The Youth says Achievement.
The Soldier says Courage.
The Editor says Success.
The Manufacturer says Efficiency.
The Banker says Wealth.
The Dreamer says Vision.
The Child says Play.
The Man says Work.

The Friend says Friendship.
The Pedagogue says Personality.
The Physician says Health.
The Biologist says Growth.
The Psychologist says Unfoldment.
The Sociologist says Adjustment.

But the true educator says all of these, and more, must be the aim of education. To realize many of these ideals of education, the true educator feels that the schools need greater cooperation, greater support, greater democracy, and greater efficiency.

—*Georgia State Superintendent's Report, 1922*

We are in receipt of some data bearing on the question of "Practice Effect and the Reliability of Four Silent Reading Tests" from Doctor Fowler D. Brooks of Johns Hopkins University. Classes in grades III to VIII, inclusive, were tested on two forms (where available) of each of the tests at intervals of five to eight days. In grades III-A and VI-A any difference in difficulty of alternate forms was eliminated by giving one form to half the pupils on the first occasion and another form to the other half on the second occasion. For the second testing the groups were reversed. In all the classes about one-third of the pupils had previously taken the Courtis Arithmetic Tests; there was therefore a certain familiarity with testing in general. No special training or remedial work in reading was done between the two tests. The

PRACTICE EFFECT OF TAKING SILENT READING TESTS

	III-A	IV-B	V-A	VI-A	VII-A	VIII-A
Number of Pupils Tested	43	25	36-42	67	26	35
Burgess, P. S., 1 and 2						
Ave. Change	15.5		15.8	11.5	15.5	10.6
Ave. Improvement	8.7		15.2	4.0	13.6	1.7
Monroe, Forms 1 and 2						
Rate—Ave. Change		30.4	31.3	25.6	23.8	25.9
Ave. Improvement		20.3	31.1	23.0	19.9	23.5
Comprehension—Ave. Change		1.6	2.1	2.0	2.1	1.9
Ave. Impvt.		.2	1.8	.6	1.6	1.0

tests used were Burgess, P. S., I and II; Courtis, Forms 1 and 3 (given only to grades V and VI); Haggerty, Sigma I (given only to grade III); and Monroe, Forms 1 and 2.

The following table presents the results secured from two of the tests. They are offered here as suggestions to those who may wish to follow the method further.

It is fully recognized that the small number of cases makes impossible any positive conclusion regarding practice effect and reliability. Average change is the average of the differences between the individuals' first and second scores regardless of signs. Average improvement is the difference between class averages on the two trials. The reliability of these data is indicated by a comparison of the average change with the average improvement.

I have read with much interest a review of one of my books,[2] prepared by Mr. Worth J. Osburn, of Madison, Wisconsin, and published in the November number of *The Journal of Educational Research;* and, while an author is usually justified in accepting, without answer, the opinions of various reviewers, I should feel that I had been unfair to my publishers, the editor of the series, and to the many students who are now using the book as a basal text, if I were to permit such caustic criticisms to go unchallenged.

Let me say that I feel that a reviewer is freely entitled to his personal opinions, although they are sometimes accepted as representing group opinion rather than individual, but, in this case, the criticism seems to me to be so palpably unfair in some of its parts that it is best that both sides be given a hearing. Consequently, may I state some of the points in which the reviewer seems to be in error?

In the first place, the author of *A Guide to Educational Measurements* did not select the title of the book; he simply agreed to it after it had been selected by a group of individuals whose business it is to select titles.

In the second place, his charge of indefiniteness and unreliability is not supported by good argument. He infers, after reading the material on page 31, that the author assumes all correlations to be positive, but, apparently, he did not read the material on page 34 where the subject of negative correlation is treated. His criticism of the material on page 38 is superficial; the processes through which the student goes in computing corrections and standard deviations were fully explained in the preceding chapter (IV); there was no reasonable necessity for repeating them in Chapter V. He is perfectly right in his criticism of the Willis formula; typographical errors appear, due to last-moment "dropping out" at the printer's, but these are being corrected.

In the third place, his suggestion that I should have defined "intelligence" is beside the point. Naturally, such a book does not, in style or form, permit of lengthy discussions or argument, but, in order that it will not be felt that the author has not had the "temerity" to discuss and define "intelligence," he may be permitted to invite the reviewer's attention to his monograph[3] on the subject.

In the fourth place, I did not in any sense attempt to do what Professor Monroe has done so well in his *Measuring the Results of Teaching.* Had I undertaken to specify types of remedial instruction or interpretation of test results, a hundred reviewers would have risen up to smite me, for not only

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[2] Hines, Harlan C. *A guide to educational measurements.* Boston, Houghton Mifflin Company, 1923. 270 pp.

[3] Hines, Harlan C. *Measuring intelligence.* Houghton Mifflin Company, 1923. 146 pp.

is it necessary for remedial instruction and interpretation to be determined at the place and under the conditions where the tests are given, but the volume would have run to some six hundred pages. Again, I do not doubt that the teacher "wants a sort of guidance which will tell *her* what test to use and *what to do about it* after the test is given" but, again, it is impossible to be specific when speaking to large and varied groups. There are such strong differences in local situations that the reviewer must realize that what he proposes is not attainable.

In the fifth place, I could not hope that many persons would agree upon the details that go to make up the three-foot shelf. It was not proposed as one from which the teacher might not depart, but set up as a working model from which she might compose her own. Thus far, the only radical changes I have seen fit to recommend are a few substitutions that will tend to make the number of tests much smaller; and in doing that I have not included the tests the reviewer lists because of the fact that they are unwieldy for the classroom teacher to administer. It should be added that Otis's S. A. Tests *were* included in the original list.

In the sixth place, when the reviewer said that the book contains "nothing additional to what is already in print," and "contributes little or nothing to what is already available," he completely disregarded the treatment of tests for secondary-school subjects; undervalued the appraisement of intelligence-test material; and failed to account for the treatment of many new tests not heretofore presented in public print. His statements, in this connection, are extremely extravagant.

Perhaps the editor of the book could answer best why he praised the book so highly in the editor's Preface, but the author may take the liberty to answer for the publishers that there seems to have been a great demand for just such a volume. The author, speaking for himself, is able to say that, after waiting several years for somebody to produce a book of like character, but waiting, like the reviewer, "in vain," sat himself down and laboriously "ground out" the "Guide." But he refuses to be lopsided in his point of view. Whenever a better book for the same purpose is published, he will be one of the first to adopt it. He has, in his classes, used every book on measurements thus far produced. They all have had some shortcomings but, in their respective turns, have served a definite purpose.

HARLAN C. HINES

College of Education, University of Cincinnati

Doctor W. W. Theisen, Assistant Superintendent of Schools, Milwaukee, has furnished us with the following score card for textbooks in social sciences. The weighting is on the basis of fifty judgments. Doctor Theisen will be glad to receive criticism on the card.

A Score Card for Textbooks in Social Sciences
(Milwaukee)

	Possible Score 1000 Points		Actual Score
	Total	Detail	
I. Value of Subject Matter	*400*		
(a) Character	(250)		
1. Socially useful, immediately practical, up-to-date		75	
2. Information valuable		50	
3. Authentic		50	
4. Abundant provision for application to present situations		75	
(1) For development of cooperative service		(40)	
(2) For development of leadership		(35)	
(b) Adequacy	(150)		
1. All desirable topics included		25	
2. Stress proportioned to importance in the life of a young citizen and sufficient to develop a clear understanding of the topic presented		100	
3. Small percentage of undesirable material		25	
II. Method of Presentation and Organization	*550*		
(a) General plan and point of view	(100)		
(b) Appeal to interests of pupils	(225)		
1. Style—clear, simple, vivid		50	
2. Rich in variety and quantity of illustrations		25	
3. Provision for correlation with other subjects and home life		35	
4. Sequence of topics in accord with developing interests of pupils		40	
5. Calculated to develop pupil's interest in further study of social sciences		75	
(c) Good study facilitated	(200)		
1. Language easily comprehended		30	
2. Full, well-organized index and table of contents		25	
3. Graphs, maps and pictorial aids, sufficiently pertinent, easily understood		30	
4. Abundance of good problems and questions for developing civic thinking		45	
5. Good outlines for comparisons and contrasts		25	
6. Good chapter and paragraph headings and side-headings		25	
7. References good, definite		20	
(d) Teacher aids, suggestive, abundant	(25)	25	
III. Mechanical Excellence	*50*		
1. Size and clearness of print		15	
2. Quality and durability of book		35	
	1000	1000	

High-School Classification in Martins Ferry, Ohio

In an effort to make the aim of high-school work more precise, and in order to create groups of like ability to the end that more effective instruction may be given, freshmen high-school pupils during the past three years have been classified on the basis of certain clearly defined factors. For each pupil a chart is constructed showing: (1) the score in group intelligence tests; (2) the chronological and mental age at time of testing; (3) the intelligence quotient; (4) eighth-grade teachers' ratings in scholarship and industry; (5) the grade building from which he came; (6) eighth-year marks in grammar and arithmetic; (7) the high-school course selected; (8) vocational tendencies, if any, which have been discovered through talks with parents, questionnaires on vocational desires, special aptitudes, etc.; and (9) notes on health, home conditions, etc.

The case of each pupil is studied with a view to placing him in a superior, average, or low section in Latin, algebra, and English. Into the A sections go the high I.Q.'s (usually 120 or above) who show excellent school records, and a few high I.Q.'s whose marks have not been quite so good but who may be induced to do better work. A few pupils whose class work is excellent although their native ability is not quite so high may also be included. Into the C sections go the pupils showing low I.Q.'s and those of average mentality who because of ill health or for some other reason are unable to cover more than the fundamentals of the subject. However, no pupil with an I.Q. below 90 is allowed to take algebra or Latin except at the urgent demand of his parents. Data now being gathered indicate that next year even these will probably be refused.

A pupil is not always given the same classification in all his studies, but the results usually indicate that he should be. An effort is being made to work out a differentiated course of instruction which shall select the minimum essentials for the lower groups and provide supplementary material for the upper sections.

Sympathetic cooperation on the part of the teachers has made possible the degree of success which has attended this project—a success which is attested by the fact that practically no complaints have been made by either pupils or parents.

MRS. MARGARET BRAINERD

Director of Research, Martins Ferry, Ohio

A Method of Recording Standard Test Scores

In the Riverton (Wyoming) schools a simple system has been devised which seems to work very satisfactorily. It has now been in use for three years, and the individual cards are proving of great value in grading and classifying pupils.

The following is a form of the card in use, with the actual scores of a pupil recorded thereon:

Name	Holmberg, Frances																							
Year					'21	'22	'22	'23	'23	'24														
Grade					II		III		IV															
Age					6[11]		7[11]		8[11]															
I. Q.					104																			
Reading					120	158	112	112	100															
							170																	
Arithmetic					102	120	100	170	108															
								166	180															
Spelling					100	127	100	152	118															
Language						200	125																	
Vocabulary								196																
Average																								

The various scores on this card are derived by the simple process of dividing the pupil's actual score in any test by the standard score for that particular test. Hence a score of 100 on the card indicates that the pupil has attained standard achievement in that subject. The general status of a pupil is evident at a glance. All scores above 100 represent surplus achievement in that subject. Contrariwise, scores below 100 represent a deficiency in attainment.

The record is cumulative. The need for special drill in any subject soon becomes evident. The card provides for two series of tests per school year. In addition, space is provided for recording scores made in two different types of tests in the same subject; as for example, scores in the fundamentals of arithmetic, and reasoning in arithmetic. A regular attainment of high scores soon suggests the possibility of special promotion. The card is simple enough to be understood by the average parent without any detail of explanation. It is adaptable to the use of any particular kind of standard test. It permits of a change of tests in a subject without altering its interpretation. The card places before the teacher or principal at a glance the child's age, general intelligence, and scholastic standing in various subjects.

The card serves the practical purpose of placing before the principal in a condensed form a simple, understandable, and fairly accurate picture of the individual child's needs and attainments.

C. W. Whitlow

Riverton, Wyoming

A Comparison Among Types of School Organization

The March, 1923, issue of the *Journal of Educational Research* carried an account of a study of four types of upper elementary grade organization which was being carried on by the Seattle, Washington, Department of Research. Since that time, two phases of the study have been completed and have given results which seem worthy of brief report at this time.

1. *Standardized Educational Opinion Concerning Intermediate Organization.*—A description of four types of schools, of which Seattle has the first three, was sent for comparative evaluation to some eighty specialists in education and superintendents of large city schools. An abbreviated description of the four types follows:

(1) Academic Schools, in which no manual training or home economics work is offered.

(2) Industrial Schools, in which the seventh and eighth grades devote at least one hour a day to manual training and home economics.

(3) Semi-departmental (Platoon) Schools, which also have industrial work, and in which such special subjects as music, drawing, and penmanship are taught by special teachers rather than by grade teachers.

(4) Junior High Schools, in which the seventh, eighth, and ninth grades are separately organized upon a semi-departmental plan.

Each type of school was judged on the basis of the degree to which its form of organization improves each of ten selected factors of school efficiency, namely: 1, Attendance; 2, Progress; 3, Achievement; 4, Curriculum; 5, Instruction; 6, Administration; 7, Supervision; 8, Guidance; 9, Socialization; 10, Low Cost. A "general estimate" was also called for.

Usable rankings were returned by thirty educational experts, and twenty-two superintendents. Judged by the number of times each type of organization was ranked first (ties excluded) in the "general estimate," the following rankings prevailed. (The judgments of thirty-three local elementary-school principals are added.)

Judges	Number of Times Each Type of Organization was Ranked First			
	Academic	Industrial	Semi-departmental	Junior High
Experts	0	1	1	24
Superintendents	0	1	4	16
Principals	0	3	5	25
Total	0	5	10	65

The combined scorings of the thirty educational experts and the twenty-two superintendents ranked the junior high school first; the semi-departmental school second; the industrial school third; and the academic school last for every factor of efficiency except low cost, for which the order was reversed. Some of the ratings were fairly close, however, as may be seen from the table below. In this table three merit points were allowed when a factor was assigned first place by one of the judges; two points were allowed for second place and one for third place.

2. *Comparative Accomplishment of Academic, Industrial, and Semi-Departmental Types of Organization.* The academic, industrial, and semi-departmental types were also compared on the basis of school accomplishment. Six academic, six industrial, and four semi-departmental schools with similar general school conditions were selected for study. The achievements of 324 eighth-grade graduates of 1921 were compared. Only those graduates were chosen who had been in their respective schools at least four years and had attended a Seattle high school one year. Allowance was made for difference in intelligence, and the three groups of schools were then compared on the

Factors	Percent of Merit Points Received by Each Type of Organization			
	Academic	Industrial	Semi-departmental	Junior High
1. Attendance	5	19	32	44
2. Progress	6	19	31	44
3. Achievement	7	21	35	37
4. Curriculum	5	31	20	44
5. Instruction	8	18	32	42
6. Administration	21	22	24	33
7. Supervision	14	17	29	40
8. Guidance	4	19	29	48
9. Socialization	5	19	33	43
10. Low Cost	45	24	22	9
Final Rating	12	21	29	38

basis of standard tests in arithmetic and reading, on teachers' estimates, on the rate of promotion through the grades, and on success in high school.

On the basis of elementary-school achievement, the semi-departmental group of schools leads in every case, as follows. The figures are given in average years of standard pupil accomplishment, other things being equal.

Types	Graduates	Reading Achievement	Arithmetic Achievement	Teachers' Estimates	Gain in Promotion
Semi-departmental	93	16.39	15.30	15.16	.19
Industrial	137	15.81	14.28	14.85	.05
Academic	94	15.62	14.23	15.13	.09

Judged on the basis of marks received during the first year of the high school the particular type of elementary school attended is not important. Success in high school is apparently more dependent upon intelligence than upon elementary-school success.

It will be possible to answer this latter question more definitely as we secure additional data on the progress of these same 324 pupils in the high schools and make a recheck of their mentality on the basis of new intelligence tests. Meanwhile the testimony already at hand is markedly in favor of the platoon type of organization.

Fred C. Ayer

Professor of Education, University of Washington, and Director of Research, Seattle Public Schools.

Educational Research Association

(HARRY A. GREENE, *Secretary and Editor*)

Rural Survey in Delta County, Colorado

Under the inspiration of Miss Alice Burnett, county superintendent of schools, six contiguous rural districts of Delta County, Colorado, have asked Dr. H. T. Manuel, director of Educational Research of the Western State College at Gunnison, to direct a school survey of the several districts. The chief problem of the survey is the mapping out of a program for their high-school system. At present there are two high schools in the combined area, and some pupils are being sent to a third located outside of the area entirely. The feeling has developed that it may be possible to institute one central high school that will be much more effective and economical than is the present arrangement. Before proceeding, however, a systematic survey is desired.

Cleveland Research Club

There is in existence in Cleveland an organization which might well be duplicated in many city school systems. It is known as the Cleveland Educational Research Club. In 1920 a group of people definitely interested in the promotion of a high grade of educational research met and organized for the purpose. At this time, Dr. W. W. Theisen, then Director of Reference and Research was selected as president and Miss Florence Brooks of the Fairmont Junior High School was made secretary. By constitution the membership was limited to eighteen in the hope that only those who would produce a high grade of research would be included, and for the further reason that by thus limiting the membership each member would be given an opportunity to contribute something personally during the year. After two years of very successful work carried forward by the same officers the club voted to expand its membership and to divide itself into two sections, each to be presided over by vice-presidents and to conduct its own program. At this time Dr. Garry C. Myers was elected president of the club and Dr. Bertha Lucky, psychological examiner, and Principal William Connor of the Longwood High School of Commerce were chosen as vice presidents.[1]

The present plan calls for a short joint meeting of the club for the transaction of business after which the programs follow. The members go to each group alphabetically, a plan which insures equality of attendance. At the end of this year thirty-one persons will have presented papers before

[1]Mr. Connor has since become Director of Reference and Research, thus succeeding Dr. Theisen.

these meetings—all voluntary research done at personal sacrifice and by persons about half of whom are classroom teachers.

The present membership which includes representatives from Lakewood, East Cleveland, Shaker Heights, and Cleveland Heights, has almost reached the one hundred mark, suggesting the possibility of forming a third section next year. It is the desire of the members to stimulate research among teachers and school officials in Cleveland and its environs to such a degree that in every school building there will be a large number of teachers working at some problem. Whether they find anything or not is not so important as that they get into the habit of seeing problems and of developing an experimental attitude toward them.

Comparative Silent-Reading Ability of American and Chinese Children

A most interesting bit of research has recently come to the attention of the writer, and on account of its interest it is recorded here for the benefit of those likely to be concerned with a similar problem. The problem which involves a comparison of the reading abilities of Chinese and American children was investigated by Mr. Horace T. C. Tu under the direction of Dr. Ernest Horn of the University of Iowa.

The student states his purposes are threefold: (1) to find the reading ability of the Chinese pupils in the primary grades in certain provinces of China; (2) to compare the ability of Chinese children in reading with that of American children of the same grade; (3) to find the factors which control the differences, if any.

The factor of the possible differences in level of intelligence of the subjects tested was recognized at the outset, and an attempt was made to show that what data were available revealed only very slight differences between the general level of intelligence of Chinese and American children. The following quotation from an article by Dr. Yeung in the *Journal of Applied Psychology* for September 1921 is taken as the most conclusive evidence: "No striking differences in the intelligence of Chinese and American children are indicated by the results of this investigation. The Chinese children tested at about the level of Americans and North Europeans and markedly above South Europeans . . . . The Chinese in the vicinity of San Francisco belong chiefly to the lower levels of occupational status, although there is a greater observable tendency for mental level to range above economic and social classification."

So on the basis of this, the student feels he was justified in saying that any differences that were found in the rate and comprehension of silent reading between Chinese and American children were due to the difference of languages and methods of teaching rather than to native intelligence.

Monroe's Standardized Silent Reading Test 1, Form 2, was given to 50 pupils of the third and 162 pupils of the fourth-year classes of the elementary school (equivalent to the American grades III and IV) and 149 pupils of the first-year class of the higher primary school (equivalent to the grade V). The material was translated into Chinese by the student. In order to make the test fair to Chinese children the proper nouns and special names unfamiliar to

them were changed into familiar ones; and two Chinese poems composed by the student were used instead of the English poems.

All papers were scored strictly according to the directions in the Class Record Sheet for the Monroe test. Since in each paragraph of the translation there are more words than in the original, the rate value was naturally changed. It was computed on the basis of the number of words in Chinese read per minute. As to the comprehension value, it was kept the same as in the original. If the pupil was asked to draw a circle around a word, the word must have a circle drawn around it and not a check mark placed after it. Partially correct answers were counted as wrong and no credit given.

Since the student could not go back to China to conduct the test himself, it was given by his friends who were teaching there in the elementary schools or the higher primary schools. However, they were not informed that the results would be compared with those obtained from American children. For their convenience the important points concerning the test were written in Chinese.

TABLE I. COMPARISON OF COMPREHENSION AND RATE SCORES OF CHINESE AND AMERICAN CHILDREN ON MONROE SILENT READING TEST

	Grade III		Grade IV		Grade V	
	Chinese	American	Chinese	American	Chinese	American
Number of Cases	50		162		149	
Median Comprehension	2.3	8.3*	4.7	13.3*	5.7	17.2*
Median Rate	40.9	63.0*	47.0	77.0*	66.5	98.0*

*From Monroe's Standards

"To summarize the quality of reading in the Chinese grade school is poor, according to the results found by this experiment. Both the rate and comprehension scores are far lower than those of the American children. The primary grades in China need more than three years education before they can read the same material as efficiently as those in the United States. Such results ought to be enlightening to the Chinese teachers."

Wisconsin Supervisory Bulletins

Three excellent bulletins by Dr. W. J. Osburn, Director of the Bureau of Educational Measurements in the State Department of Public Instruction, Madison, Wisconsin, were issued in September. The bulletins deal respectively with "Errors in Spelling," "The Relative Value of Letter Sounds and Phonograms," and "Improvement in the Fundamentals of Arithmetic."

The first bulletin is a preliminary report on types of spelling errors found in eighth-grade spelling papers based on the eighth-grade list in the Iowa Spelling Scales. The typical misspellings, the number of typical misspellings, and the total misspellings are shown. In contrast with a number of other

investigations of this type Dr. Osburn found that typical misspellings of these words really do exist. He concludes that the significant and important thing for the teacher to do is to fortify her pupils against the particular misspellings listed. A further tabulation shows the number of times the spelling error occurred in a specified syllable of the word. The analysis shows that certain syllables are much more likely to be missed than others. So far as this particular test list is concerned it will pay the teacher to call special attention to the italicised portion of the following words: Abso-*lute*-ly, *ac*-quire, ad-min-*is*-tra-*tor*, ad-*vis*-able, ag-*ri*-cult-*u*-*ral*, an-*nounce*-ment, an-*nu*-al, ap-*pre*-*ci*-ation, ar-*range*-ment, as-*sume*, ath-*let*-ics, bal-*lot*, ba-*sis*, cat-a-*logue*, *cer*-tifi-*cate*, con-*se*-*quent*-ly, con-*sul*-tation, cor-*re*-*spond*, *coun*-*cil*, dis-*ap*-*point*, enor-*mous*, ex-*cel*-*lent*, exten-*sion*, *fam*-ili-*ar*, has-*ti*-ly, in-*di*-*vid*ual, in*qui*-*ries*, inter-*fere*, leg-*is*-*la*-tion, lit-*er*-*a*-ture, *los*-*ing*, *mech*-*an*-ical, *mere*-ly, natur-*al*-*ly*, *nec*-*es*-sary, offi-*ci*-al, or-*ig*-*in*-al, prac-*tic*-*al*-ly, prep-*a*-ration, prob-*a*-*bly*, re-*lieved*, re-*sponse*, *sci*-*ence*, *sense*, *straightened*, super-*in*-tend-*ent*.

Data on the character and frequency of the errors are summarized in the following table. The percents in the right-hand column show the probable errors arising through sampling only one-fifth of the papers.

CHARACTER AND FREQUENCY OF THE ERRORS

	Frequency (percent)	Probable error (percent)
Failure to hear and pronounce the word correctly	25	2.0
Substitution of one vowel for another	18	1.7
Single for double consonant	16	1.7
Omission of silent final *e*	11	1.4
Omission of syllables	9	1.3
Substituting *s* for *c* (soft)	4	.8
Double for single consonants	3	.8
Using *-tion* for *-sion*	3	.8
Omission of consonants other than parts of doubles	2	.6
Insertion of syllables	2	.6
Miscellaneous	7	1.2

From this table Dr. Osburn concludes that about 80 percent of the trouble can be traced to speech and hearing difficulties. More emphasis must be placed on these defects. It is easy to imagine the havoc which can be wrought with the children's spelling when the teacher herself does not enunciate clearly. Children cannot spell words that they cannot hear.

To quote from the second bulletin "it aims to present some data bearing upon the relative value of the several vowels, consonants, and phonograms as they are related to the mastery of the first 2,500 words in the Thorndike Word List and to the 1,000 words in the Ayres Spelling list. The former constitute the most important words which the child reads, the latter the most important ones for him to learn to spell."

In the "Improvement in the Fundamentals of Arithmetic" which is presented as a partial answer to the question "What *else* can we do?" Dr. Osburn points out that teachers have been too prone to emphasize only the forty-five principal combinations. The child who has a real mastery of the fundamentals will need at least all of the following:

100	combinations in simple addition
225	combinations in column addition
175	combinations for carrying in multiplication
100	combinations for simple subtraction
178	combinations for the subtraction in short division
100	combinations in multiplication
450	combinations in short division (including the uneven divisions)
Total 1,328	